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Directorate of Distance Education

BBA

V - Semester

104 52

MANAGEMENT ACCOUNTING

Reviewer

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Management Accounting

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Unit 13: Payback period — Accounting rate of return - Discounted cash flow – Net present value – Profitability index – Internal rate of return.	**Unit 13:** Appraisal Methods **(Pages 306-344);**
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INTRODUCTION

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Management accounting is a vast subject and encompasses all that accounting information which helps management in planning, controlling, decision making and performance measurement of business operations. CIMA has observed that management accounting combines accounting with finance and management with the leading edge techniques needed to drive successful business.

Management accountant plays a very important role in an organization. He analyses and interprets accounting information and meets the informational needs of management at different levels. In an organization, a management accountant generally performs a staff function, *i.e.*, advisory role. But if he is permitted to participate in planning and decision-making, he is a part of the management team and thus becomes a part of the line function. It is very important that status of the management accountant in the organization is clearly defined so that the scope of his work and responsibilities are accordingly determined.

This book, *Management Accounting*, is written with the distance learning student in mind. It is presented in a user-friendly format using a clear, lucid language. Each unit contains an Introduction and a list of Objectives to prepare the student for what to expect in the text. At the end of each unit are a Summary and a list of Key Words, to aid in recollection of concepts learnt. All units contain Self-Assessment Questions and Exercises, and strategically placed Check Your Progress questions so the student can keep track of what has been discussed.

BLOCK - I
BASICS OF MANAGEMENT ACCOUNTING

UNIT 1 NATURE AND SCOPE OF MANAGEMENT ACCOUNTING

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1.0 INTRODUCTION

Accounting plays a crucial role in the functioning of an organization. It not only helps in enhancing decision making capabilities, but also facilitates the efficient utilization of resources. Organizations across the globe operate in a highly dynamic and complex business environment, in which managers need relevant and current information to aid them in decision making. Accounting must respond to the changing needs of the decision-makers in order to justify its relevance in contemporary business. In fact, the significance of financial information has always been recognized, but in the present business scenario, such information has become a resource parallel in importance to factors of production. Consequently, accounting information is becoming increasingly critical to the continuing success of an organization. With the growing importance of information as a resource, organizations have felt the need for a system that is capable of managing this resource efficiently. This is, perhaps, the basic reason for business students to study the anatomy and operation of the accounting system, which provides information to managers for decision making.

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Modern accounting as a dynamic and growing field is emerging as a strategic weapon that is helping to shape the direction and growth of organizations in the changing business environment. However, to explore and utilize the financial information generated by the accounting system of an organization for competitive advantage, managers must have a fair knowledge of the tools and techniques that they can use for analyzing and interpreting the available information. Both the prerequisites of effective decision making—financial information and analytical techniques—are covered under *Management Accounting,* which involves the study of accounting information and techniques that managers use in analysing such information.

In this unit, you will be introduced to the concept of management accounting.

1.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the definition, objectives, nature and scope of management accounting
- Explain the differences between management accounting and financial accounting
- Describe the merits and limitations of management accounting

1.2 MANAGEMENT ACCOUNTING: DEFINITION

Management accounting is a segment of accounting that deals specifically with the analysis and reporting of information to management about the operations of the organization with an objective to facilitate decision making. On the one hand, management accounting aims to provide adequate financial information to managers for decision making and on the other, it is oriented towards managerial control. Management frequently requires timely financial information concerning different aspects of the organization, ranging from special purpose report of a specific department's operating performance to the preparation of annual budgets and forecasts, which encompass the entire business.

The term 'management accounting' was first formally mentioned in 1950 in a report entitled '*Management Accounting*', published by the Anglo-American Council of Productivity Management Accounting Team after its visit to the United States in the same year. The team in its report defined management accounting as *the presentation of accounting information in such a way as to assist management in the creation of policy and in the day-to-day operation of an undertaking.*

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Thereafter, a number of attempts have been made by various professional bodies and associations to define management accounting in its right perspective. As a consequence thereof, numerous definitions on management accounting are added to the literature year after year. Some popular ones are included in Exhibit 1.1.

Exhibit 1.1 *Popular Definitions of Management Accounting*

The Institute of Chartered Accountants in England and Wales (ICAEW): Any form of accounting which enables a business to be conducted more efficiently can be regarded as management accounting.

American Accounting Association: Management accounting is the application of appropriate techniques and concepts in processing historical and projected economic data of an entity to assist management in establishing plans for reasonable economic objectives in the making of rational decisions with a view towards these objectives.

Association of Chartered Certified Accountants (ACCA), USA: Management accounting is the application of accounting and statistical techniques to the specified purpose of producing and interpreting information designed to assist management in its functions of promoting maximum efficiency and in envisaging, formulating and co-ordinating their execution.

J Batty (1966): Management accounting is the term used to describe the accounting methods, system and techniques which, coupled with special knowledge and ability, assist management in its task of maximizing profits or minimizing losses.

Institute of Cost and Management Accountants (ICMA), London: Management accounting is the application of professional knowledge and skill in the preparation of accounting information in such a way as to assist management in the formation of policies and in the planning and control of the operations of the undertaking.

R L Smith (1962): Management accounting is a more intimate merger of the two older professions of management and accounting, wherein the informational needs of the manager determine the accounting means for their satisfactions.

Brown and Howard (1966): Management accounting is concerned with the efficient management of a business through the presentation to management of such information as will facilitate efficient and opportune planning and control.

Robert N Anthony (1965): Management accounting is concerned with accounting information which is useful to management.

Broad and Carmichael (1957): The term 'management accounting' covers all those services by which the accounting department can assist top management and other departments in the formation of policy, the control of its execution and appreciation of its effectiveness.

Shillinglow (1982): Accounting which serves management by providing information as to the cost or profit associated with some portion of firm's total operations, is called management accounting.

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T G Rose, (1957): Management accounting is the adaptation and analysis of accounting information and its diagnosis and explanation in such a way as to assist management.

R H Garrison (1982): Management accounting is concerned with providing information to managers; that is, to those who are inside an organization and who are charged with directing and controlling its operations.

All these definitions place emphasis on the information processing and decision making aspects of accounting. The analysis of the definitions further reveals that the system of management accounting is not designed to appraise and monitor the past performance of individuals and groups but to assist managerial decisions affecting the future. Thus, management accounting is a system for gathering, summarizing, reporting and interpreting accounting data and other financial information primarily for the internal needs of management. Thus, *management accounting is a system capable of generating accounting information that assists internal management in the efficient formulation, execution and appraisal of business plans that help the organizations* to *achieve their strategic objectives*.

Thus, management accounting in addition to helping managers in the decision making process, facilitates them in intra-firm resource allocations, fixation of responsibilities and the evaluation of future policies and strategies. All this brings to light an important fact—that management accounting has to perform two separate, distinct functions of financial and management reporting and that the data needs for each are often different. Few intelligent financial and economic decisions can be made in the absence of that information reservoir. Involvement with both time dimensions, past and future, places the executive near the centre of the control and decision making processes in any organization.

1.2.1 Scope of Management Accounting

Traditionally, the subject matter of management accounting mainly consisted of financial statement analysis and costing theory. As organizations began to operate in a highly dynamic and complex business environment, they realized that the existing subject matter of management accounting was insufficient to meet the challenges of the changing environment. To address the emerging challenges, management accounting enhanced its scope by including in its ambit many frameworks, tools and techniques borrowed from other disciplines such as economics, finance, mathematics, statistics and operations research. The contemporary subject matter of management accounting is summarized below:

Financial Accounting: Financial accounting is a prerequisite for any discussion on the subject of management accounting. Financial statements as generated by financial accounting contain enough data that is converted

into information by organizations and used in their decision making. In fact, management accounting provides only tools and techniques for interpretation and analysis and the management accountants get the data for the purpose mainly from financial accounting. Thus, management accounting cannot exist without efficient financial accounting system.

Cost Accounting: Although managers generally use financial information in decision making, they often supplement their decisions with cost information as they have realized that any activity of an organization can be described by its cost. They make use of various cost data in managing organizations effectively. In fact, cost accounting is considered the backbone of management accounting as it provides the analytical tools such as budgetary control, standard costing, marginal costing, inventory control, operating costing, etc., which are used by management to discharge its responsibilities efficiently.

Financial Statement Analysis: Managers frequently use information based on the data collected from financial statements. This information can be obtained either by selecting individual numbers from the statements or by developing certain trends and ratios. Any attempt in this direction is referred to as financial statement analysis. The analysis and interpretation of the data contained in financial statements can provide a reader meaningful insights and conclusions about the organization. Over the past few decades, numerous techniques have been developed which are useful for the proper interpretation and analysis of financial statements.

Budgeting: Budgeting, which lies at the heart of management accounting, refers to a systematic plan for the utilization of organizational resources. As a management tool, budgeting aims to coordinate and integrate the efforts and activities of various departments with the cooperation of those who seek to achieve a common goal. In fact, the organizations exercise their operational control through the budgets prepared in advance for every major activity of the business.

Inflation Accounting: Inflation accounting attempts to identify certain characteristics of accounting that tend to distort the reporting of financial results during periods of rapidly changing prices. It devises and implements appropriate methods to analyse and interpret the impact of inflation on the business transactions.

Management Reporting: Clear, informative and timely reports have always been recognized as managerial tools in reaching decisions that not only help the organizations to improve their performance but also make the best use of their resources. Thus, one of the basic responsibilities of management accounting is to keep the management well informed about the operations of the business. To discharge this responsibility efficiently, management

accounting needs to prepare quarterly, half-yearly and other interim reports and submit the same to the management.

Quantitative Techniques: Many managers recognize that the financial and economic data available for managerial decisions can be more useful if analysed with highly sophisticated techniques of analysis and evaluation. Such techniques as the subject matter of quantitative analysis allow managers to create information from their financial database that is not, otherwise, available. In addition to the techniques like time series, regression analysis and sampling techniques, the managers also make use of linear programming, game theory and queuing theory for this purpose.

Tax Accounting: Since taxation plays an important role in the profitability of a commercial organization, it is essential for a management accountant to have a complete knowledge of business taxation. The business profit and the tax thereon are to be ascertained as per the provision of taxation. The filing of tax returns and the payment of tax in due time is the exclusive responsibility of the management accountant.

Internal Audit: Internal audit as a discipline of management accounting makes arrangements for performance appraisal of the organization's various departments. Thus, a management accountant must possess knowledge about the fixation of responsibilities and measurement of results.

Office Services: To discharge the responsibilities efficiently, a management accountant has to deal with data processing, filing, copying and duplicating. His area of responsibilities also included the evaluation and reporting about the utility of different office procedures and machines.

1.3 DIFFERENCE BETWEEN FINANCIAL ACCOUNTING AND MANAGEMENT ACCOUNTING

The compartmentalization of accounting into various branches generally sounds somewhat artificial and misleading as all these branches are usually drawn from a common pool of financial data used in preparing reports for groups who are often involved in making a variety of interdependent decisions. But a close examination of the two systems shows that they differ in several ways from each other. Some major differences between these two accounting systems are summarized in Exhibit 1.2:

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Exhibit 1.2 *Comparison of Financial Accounting and Management Accounting*

Areas of Comparison	*Financial Accounting*	*Management Accounting*
Objective	• To measure and assess the business result and financial position of a concern	• To help decision-makers by providing them relevant and sufficient data
Nature	• Historical in its outlook	• Prospective in nature
Adherence	• Governed by generally accepted accounting principles (GAAP)	• Does not focus on generally accepted accounting principles (GAAP)
Subject matter	• Financial accounting statements are confined to the business as a whole	• Management accounting reports are prepared for each unit or division of the business separately in order to ensure effective planning and control
Compulsion	• Obligatory for the organization to maintain a system of financial accounting	• Discretion of the organization to have system of management accounting
Precision	• Focus on precision	• Based on approximation
Frequency of reports	• Financial accounting statements are prepared at the end of the financial period which is usually a period of 12 months	• The management accounting reports and statements are prepared at regular intervals depending upon the demand of the decision-maker
Recipients	• The statements are extensively used by outsiders	• The statements are exclusively meant for internal parties
Nature of the data used	• Recognize only such business transaction that can be expressed in monetary units	• Recognizes both monetary as well as non-monetary data
Publication	• Financial statement are generally published every year	• Management accounting statements and reports are not generally published

Objectives: The basic objective of accounting is to measure the business result and assess the financial position of an organization. To achieve this objective, financial accounting has to perform functions like recording, classifying and summarizing business transactions of an organization during the accounting period. Such functions are related to the preparation of final accounts, i.e., profit and loss account and balance sheet. Contrary to this, the objective of management accounting is to facilitate managerial decisions. Management accounting deals with the preparation of analytical and critical financial reports to assist management in improving the organization's performance.

Nature: Financial accounting is historical in its outlook in the sense that it has to maintain records of such business events that have taken place

during the accounting period. Under financial accounting system a transaction is recorded as and when it takes place. Therefore, prospective transactions are not considered before their maturity under such system of accounting. On the other hand, management accounting system is devised to help managers in shaping future operations of the business. It deals with projection of data to be used for planning and decision making for the future. Thus, management accounting has prospective character.

Adherence to Accounting Principles: Financial accounting system is based on some accounting principles and conventions which a financial accountant has to strictly follow while preparing financial accounts and statements. The financial accounting system can be result-oriented only when the accounting principles and conventions have been properly followed and applied. But management accounting is not bound by the constraints of generally accepted accounting principles and conventions. The preparation of reports and statements under management accounting are governed by the requirements of the management. Management can frame its own ground rules and principles regarding the form and content of information required for internal use.

Subject Matter: Financial accounting considers the business as one entity and accordingly financial accounting reports have been confined to the business operations as a whole. Such statements present the position and the performance of the entire business. Whereas under management accounting system each unit/department/division/cost centre of the business is treated as a separate entity in order to ensure effective planning and control. Therefore, profitability and performance reports are prepared for each unit or division of the business separately.

Compulsion: The Indian Companies Act has made it obligatory for the companies to maintain a system of financial accounting. At the same time, the benefits as offered by a financial accounting system have made it more or less compulsory for the non-company organization. On the other hand, the setting up of management accounting system is at the discretion of the management.

Precision: Financial accounting pays more emphasis on precision and considers only actual figures in the preparation of its statements. There is no scope for approximate figures in financial accounting. But the reports and statements as prepared under management accounting system contain more approximate figures than the actual figures. Thus, management accounting is less precise as compared to financial accounting.

Frequency of Reports: The financial statements, the outcome of financial accounting, are prepared at the end of the financial period which is

usually a period of 12 months. But the management accounting reports and statements are prepared at regular intervals so that management may not face any difficulty in decision making. Management is constantly informed about the business performance through these reports and statements. Thus, the reporting frequency of management accounting is much higher as compared to reporting of financial accounting.

Recipients: Financial statements such as profit and loss and balance sheet, are extensively used by outsiders *i.e.*, shareholders, creditors, tax authorities, etc. On the other hand, management accounting reports are exclusively meant for management. Such reports are not easily available to outsiders.

Nature of Data Used: The financial statements as prepared under financial accounting contain only such transactions that are expressed in monetary terms. The non-monetary events such as nature of competition, business reputation, change in fashion, are not at all considered by financial accounting. But management accounting uses both monetary and non-monetary data.

Publication: Financial accounting statements are published by almost every business organization for the information of the general public. The Indian Companies Act has made it compulsory for every company to publish its final accounts *i.e.*, profit and loss account and balance sheet. By contrast, the publication of management accounting reports and statements is not mandatory.

Check Your Progress

1. What is inflation accounting?
2. State the frequency of reports to be prepared under financial and management accounting.

1.4 MANAGEMENT ACCOUNTING AS AN AID TO MANAGEMENT

The primary objective of a management accounting system is to provide accurate and relevant information to internal users with the aim of helping the management to attain efficiency and effectiveness in the organization. To achieve this goal, management accounting helps an organization in the process of management which generally consists of activities like planning, organizing, evaluating, and communicating (Figure 1.1).

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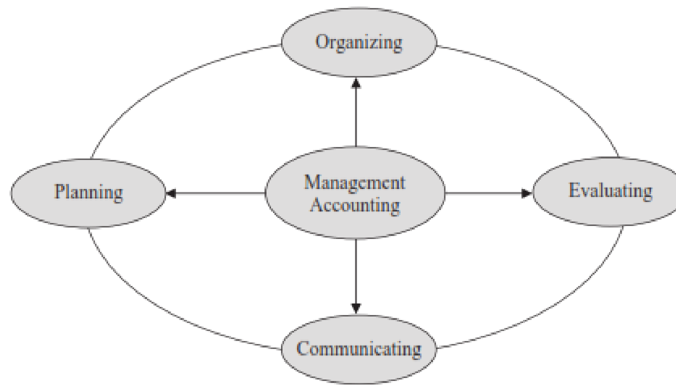


Fig. 1.1 Management Accounting as an Aid to the Management Process

Planning: Planning is an activity of management that requires the application of not only a scientific approach but also a systemic approach to decision making. All organizations irrespective of their nature of business, need to plan both at strategic and operational levels to remain competitive in the market. Since the most crucial dimension of planning that the management of an organization must focus upon is strategic in nature, one of the basic functions of the management accountant is to help management not only in the selection of the company's goals and formulation of policies and strategies but also in the allocation of resources to achieve these goals. Different accounting techniques are used by the management to discharge the function of planning efficiently. Important among them are cost-volume-profit analysis, direct costing, capital budgeting and cash budgeting.

Organizing: Organizing, which basically involves grouping of activities, defining the responsibility and granting authority to employees, aims to develop structural relationship among people and physical resources to carry out plans and accomplish the organization's stated objectives. Since organizing is prerequisite for the success of any organization, therefore, this function not only calls for undivided attention from the management of an organization but also continuous monitoring and audit to ensure its effectiveness and relevance in a dynamic business environment. To attain this objective, management accounting assists the management of an organization in organizing by establishing cost and/or cost centres.

Evaluating: Evaluating, commonly known as controlling, is the process of determining whether the organizational performance is consistent with the plans. This function of management, in fact, involves the comparison of actual performance with the standards to identify the deviation if any for the purpose of initiating and implementing measures to adjust organizational activities toward goal attainment. Management accounting helps the management of an organization to monitor progress and make appropriate adjustment by generating various feedback/performance reports. An effective evaluation

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system contributes to the efficiency of organization which in turn increases the profitability of the concern.

Communication: Communication, which involves transmission of information to the stakeholders, has been recognized as an essential function of management accounting. In fact, the management accountant spends the maximum time in communicating with various parties that are interested in the affairs of the business. In addition to the publication of company's annual report, which is considered the basic task of a management accountant, it becomes equally important for him to prepare various supplementary reports required by the management to address various problems and challenges that emerge due to changing and competitive business environment.

1.4.1 Objectives and Functions of Management Accounting

The basic role of management accounting is to provide accurate and relevant information to the internal parties of an organization for decision making. To discharge this responsibility effectively, management accounting has to undertake collection, processing, analysing and interpreting of data, as well as communication of the resulting information to such internal parties who intend to use the same in their decision making process. In fact, the said activities can be recognized as the bases to identify and examine the functions of management accounting and accordingly the major functions are summarized below:

Data Collection: The first function of management accounting is to collect the requisite data from all possible resources. Since the data was traditionally restricted only to economic and financial items/factors, management accountants would make use of the financial statements like profit & loss account and balance sheet for the purpose. Over the past few years, the activities of management accounting have crossed all traditional boundaries by considering not only monetary items and factors in its studies but also non-monetary factors like. Such paradigm shift in the approach of the management accounting has made its scope much wider. To meet the growing demands of the wider scope, management accounting is bound to utilize both internal as well as external sources of data collection.

Data Processing: The data so collected and stored needs to be converted into information through processing. Data processing refers to the series of activities consisting of compilation, classification, tabulation and summarization that aims to make data information.

Analysis and Interpretation: The data collected from various internal as well as external sources does not have inherent meaning and in fact, its meaning is generally influenced by the nature and scope of the tools and techniques used for its analysis. Further, the data as such is not of much use for the management but it becomes so once it is analysed and interpreted in

the context of the nature of the decisions. Thus, the process of analysis and interpretation makes the data so significant for the success of the organization that it is being recognized as a strategic asset for the company in a competitive market. However, the management accountant has to choose the relevant and most appropriate technique for proper interpretation of the data after taking into consideration the nature of the concerned problem.

Communication as a crucial function of management calls for the transmission of information to the concerned parties for use. Management accounting plays a special role in managing the affairs of the business by providing not only the conventional reports to the decision makers of an organizations but also in taking necessary measures to ensure the supply of adequate information at right time to enable the decision-makers of the organization to address the challenges of the changing environment.

In addition to basic functions discussed above, management accounting is also responsible to carry out some secondary functions that are summarized below:

Coordinating: Management accounting is often entrusted with the responsibility to coordinate the various activities of a business. Organizations generally use techniques such as budgeting and financial reporting for the purpose.

Special Studies: Contemporary business is operating in a dynamic environment where even a minor change in any of its elements can have a significant impact on the business outcomes. Therefore, management is always interested to know the areas of business which can contribute to the stability and profitability of the concern. To meet this objective, management accounting carries out various special studies such as sales analysis, economic forecasts, price spread analysis, etc.

Tax Administration: In the modern business organizations, tax administration is being recognized as a significant area of study that falls within the scope of management accounting. Tax administration involves tasks like the submission of necessary documents and return to the tax authorities, including the supervision of all matters relating to tax.

1.4.2 Tools and Techniques of Management Accounting

Management accounting is an information system designed to communicate meaningful economic and financial information to managers, so that they may discharge their functions efficiently. It makes extensive use of a number of tools and techniques to meet the increasing needs of business. Important among them are:

Financial Planning: Planning is necessary not only for better organizational performance and progress, but also for efficient utilization

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of available resources. In fact, it is recognized as a prerequisite for financial functions wherein finance plays a deciding role in executing them effectively. Financial planning is the process of deciding in advance the financial objectives, policies and procedures. An organization can achieve long-term, as well as short-term, financial objectives by employing financial planning. In the short term, it can help a concern in meeting its obligations by balancing the flow of funds. At the same time, its proper application can ensure efficient utilization of available financial resources in the long term.

Analysis of Financial Statement: Financial statement analysis is a growing and ever changing set of systems and procedures designed to provide decision makers with relevant information derived from basic sources of data such as company financial statements and government and industry publications. Over the years, a number of techniques have been devised to analyse financial statements e.g., comparative financial statements, common-size statements, ratio analysis, trend analysis and fund flow statement.

Cost Accounting: Cost accounting is a vital part of the accounting system. It includes recording, classifying, analysis and reporting of all cost facets in a company's performance. Cost accounting procedures have to be designed carefully after taking into consideration the nature and requirements of the business and the data required at the different levels of management for effective cost control and cost reduction.

Standard Costing: Another major technique commonly used by the organizations for exercising control is standard costing. Under this arrangement standard costs are used to control the major activities of the business. Standard costs are predetermined targets against which actual results are evaluated. This is the basis for a system of management control for which the proper monitoring of performance is a key factor. The variances between standard and actual costs are computed and reported to management.

Marginal Costing: Marginal costing is a managerial technique that considers only variable cost in the decisions concerning with additional output. It is a reporting system that values inventory and cost of sales at its manufacturing variable cost. It is frequently used an internal management reporting system.

Budgetary Control: Budgetary control refers to a system of business control that uses budgets to control the major activities of business. The budgets for all major activities of the business are prepared in advance and the actual operations are carried out in accordance with the budget estimates. Generally the budgets are prepared by updating the previous year's figures in the light of some forward projections.

Funds Flow Analysis: Funds flow analysis attempts to highlight the causes of change in the financial position of a business enterprise between

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two balance sheet dates. Any statement prepared for this purpose refers to as funds flow statement. A funds flow statement helps managers in the efficient management of funds.

Management Reporting: Management reporting is considered as an essential component of a well designed planning and control system. Decision makers frequently require information on various aspects of business. Thus, it is the responsibility of the management accountant to communicate the required information to management at the right time and in a right manner.

Statistical Analysis: Accountants frequently confront masses of data from which they have to draw systematic and logical conclusions. Statistical analysis in general and sampling theory in particular provides them a scientific method to draw reliable and valid conclusions about the properties of an entire population by studying only a chosen sample of the population.

1.5 MERITS AND LIMITATIONS

In this section, let's discuss the merits and limitations of management accounting.

Merits of Management Accounting

Management accounting offers the following benefits to the organizations:

- It increases the efficiency in business activities.
- It ensures efficient regulation of business activities by establishing an efficient system of planning and budgeting.
- It makes possible the efficient utilization of the available resources and thereby increase the return on capital employed.
- It ensures effective control by comparing actual results with the standards.
- It helps maintain good relations with the public by providing quality service to the customers.
- It provides the means to motivate the employees.
- It keeps managers informed about the ongoing operations, thereby enabling them to suggest remedial measures in case of deviations.
- It helps in evaluating the efficiency and effectiveness of the organization's business policies by incorporating management audit.

Limitations of Management Accounting

Despite the benefits mentioned above, management accounting suffers from several drawbacks:

- Management accounting uses data that are available from financial statements. Thus, the validity of the decisions largely depends on the

reliability of the historical data as obtained from conventional financial statements. Any drawback in such statements is bound to affect the effectiveness of the decision.

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- The application of management accounting tools and techniques requires knowledge about various subjects like accounting, costing, economics, taxation, statistics and mathematics, engineering and management. To find a manager in the organization with a comprehensive knowledge of all these subjects is almost impossible.
- Though management accounting attempts to analyse both qualitative and quantitative factors that influence a decision, the element of intuition in managerial decision has not been completely eliminated. There is a tendency among business executives to use a short-cut approach to managerial problems rather than the lengthy process as required by the scientific analysis prescribed by management accounting.
- The installation of management accounting system requires a huge investment both in terms of money and manpower. Therefore, smaller concerns may not be able to afford it.
- Management accounting is in the process of evolution and as such it still has to go through many developmental processes before reaching a final stage. Consequently, the techniques of management accounting lack the sharpness and fluidity that is required of an efficient system. Even the analysis and interpretation considerably differ from organization to organization.
- The management system cannot be replaced by a system of management accounting, as the latter system simply provides the necessary data for a decision and not the decision itself.
- The principle of objectivity is not always followed in its real spirit in management accounting as the collection and analysis are considerably influenced by the personal bias of the management accountant.

1.6 CHANGING ROLE AND TASKS OF MANAGEMENT ACCOUNTANTS

Traditionally, the role of the management accountant has been of a facilitator responsible for providing sufficient accounting information to the decision-makers in an organization. Therefore, the management accountant was responsible for devising and operating an accounting information system that was capable of collecting, processing, interpreting and communicating the accounting information for use within the organization with the aim of attaining organizational efficiency and effectiveness. Thus, traditionally, the job of the management accountant in an organization as advocated by Williamson (2003), has revolved around the following major activities:

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- Accounting for product valuation and pricing
- Policy formulation and planning
- Decision making
- Cost control

Recent developments in information technology, accompanied by the emergence of knowledge management, a rapidly changing competitive environment and increasing globalization of business have led corporate houses to introduce strategic orientation in their planning process. The change in orientation is bound to bring a drastic change not only in the nature and scope of management accounting but also in the task and role of the management accountant in business organizations. Realizing the need to bring changes in the role of management accountants, Siegel and Sorensen state that the role of accountants should continually evolve to remain relevant in the changing business environment. The traditional role of the management accountant, which has been restricted to the supplier of operational and financial information within the organization, is no longer sufficient to meet the growing demands of a changing business environment. Therefore, the management accountnt needs to grow into a high-level decision support specialist who would help a company in strategic management efforts. Thus, the emerging role of a managerial accountant will be quite different from his traditional role in the sense that he has to be an active participant in the decision making process, along with the functional managers in an organization. Such participation will not only make him a member of a firm's functional team that is responsible for value creation but also change the nature of his job from a 'staff' to a 'business partner'.

The new role of the management accountant, which calls for a change not only in the task but also in his status within an organization, has been captured by many scholars as:

> Management accountants will get a number of opportunities to initiate and execute specific actions to address the changes in the global economic environment. The traditional role of providing accurate, timely and relevant information of a management accountant will be replaced by a wider and vibrant role where he will be an active participant in the strategic process of an organization.

The below-mentioned comments of Siegel and Kulesza about the new role of management accountant are not different from the above-mentioned views:

> Management accountants are business partners with their customers (managers in operating or service units), internal consultants and organizational educators.

These views are also supplemented by the remarks of Siegel and Sorensen,who said that the characterization of management accountants in leading-edge companies has gone from 'bean counter' and 'corporate cop' on

the periphery of business decision making, to 'business partner' and 'valued team member' at the very centre of strategic activity.

Thus, the emerging role of managerial accountant will be quite different from his traditional role in the sense that he will be active participant in the decision making process along with functional managers in an organization. Such participation will not only make him a member of a firm's functional team that is responsible for value creation but also change the nature of his job from a 'staff' to a 'business partner'. The change in the role of management accountant on the one hand will widen the horizon of his job and on the other hand will make his job more demanding in terms of potential and skills. The new role, in fact, will provide the management accountant more opportunities to explore his potential in meeting the expectations of the stakeholders in an organization. However, to address the emerging challenges of the new role, the management accountant must be adaptable with sufficient knowledge of a range of relevant disciplines so as to be able to provide the right information at the right time.

To compete and grow in a highly competitive and complex business environment of the future, organizations need to develop capacity and competence to create and deliver superior delivered value to customers and use the same as a sustainable competitive advantage. Consequently, management accountants are bound to help their organizations not only in measuring the cost of operation accurately but also in identifying and devising the means for eliminating non-value added costs which they will be able to do only if they possess adequate knowledge of the value-creating process of their respective organizations. While commenting on the opportunities of enhancing the value of a firm's output, Cooper states that cost management, like quality, has to become a discipline practised by virtually every person in the firm. Since the effective use of cost management techniques calls for the application of tools and techniques not only from management accounting but also from engineering and other functional areas of management, the task of management accountants has become multifaceted, which demands knowledge of project management and manufacturing processes. Thus, management accountants need to possess sufficient knowledge of the latest costing tools and techniques like target costing, activity-based costing, throughput costing, strategic cost management, kaizen costing and balanced scorecard.

1.6.1 Management Accountant in an Organization

The questions that generally strike the mind of a student while studying management accounting are (i) who is a management accountant? and (ii) what is his status in the organization? A management accountant occupies a pivotal position in the organization and is responsible for devising and operating an accounting information system that is capable of collecting,

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process, interpreting and communicating the accounting information for internal users of the organization. However, in Indian corporate houses, the position is commonly known as 'financial controller', 'controller of finances', 'financial adviser', and 'director finance' rather than management accountant. To answer the question 'what is the status of management accountant' in an organization, one needs to examine a firm's organizational structure. Organizational structure, which is basically a framework within which people work together to achieve organizational goals, involves breaking up of the total work of the organization into workable units with clearly defined duties and responsibilities. Such a structure not only helps the employees of an organization to understand their positions and authority within the organization but also defines their relationship with each other. Therefore, it is essential for an organization not only to have a clearly defined organizational structure but also communicate the same to its employees. The most popular tool to make employees understand the organizational structure is 'organizational chart', which is the schematic diagram of the various job positions. Figure 1.2 portrays the status and physical location of management accountants in the Oil and Natural Gas Corporation (ONGC) of India Ltd.

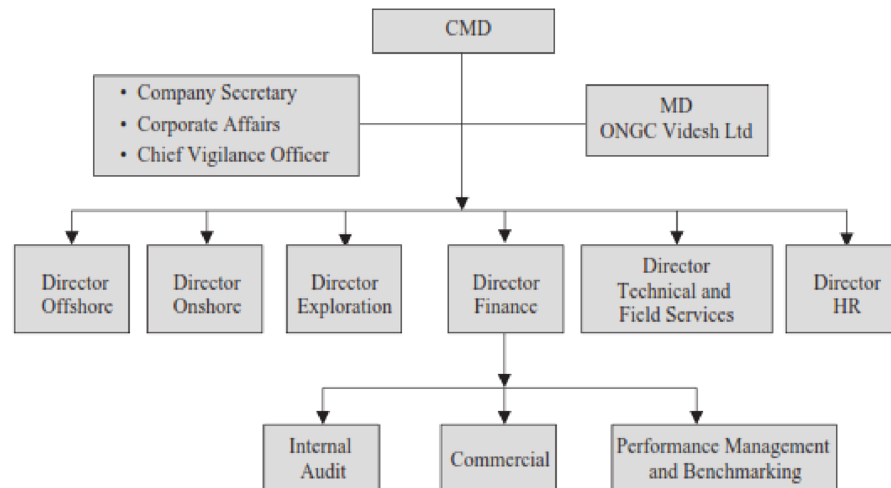


Fig. 1.2 *Organizational Chart of the Oil and Natural Gas Corporation (ONGC) Ltd*

Source: Compiled from the information available on the ONGC website (www.ongcindia.com)

The chart, in fact, clearly depicts line and staff positions in the corporation. In the context of employees' authority and role, the position of the corporation can be conveniently categorized into two forms: 'line' and 'staff'. Since in a line position, the employee has the authority to plan, organize, direct and control the activities of the organization, therefore, he is directly involved in attaining organizational goals. Whereas a staff position serves in the capacity of an advisor, he indirectly contributes towards achieving the organizational goals. Management accountants are generally recognized

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as staff positions that are devoid of the formal right to make decisions and as such have no direct responsibility for accomplishing the objectives of an organization. Therefore, management accountants are meant to assist functional managers in carrying out the tasks that are necessary for attaining the goals of the organization. However, the accountants possess the authority over their staff deployed in their respective units.

It must be understood that management accountants in India are generally members of strategic teams in large organizations. In fact, they have the responsibility of providing relevant and timely data to the team in order help it in planning and controlling activities of the organization.

Check Your Progress

3. What is the special role played by management accounting in managing the affairs of the business?
4. How does the element of intuition affect management accounting?
5. Mention the activities around which the traditional job of management accounting revolved as per Williamson.

1.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Inflation accounting attempts to identify certain characteristics of accounting that tend to distort the reporting of financial results during periods of rapidly changing prices.
2. Financial accounting statements are prepared at the end of the financial period which is usually a period of 12 months whereas management accounting reports and statements are prepared at regular intervals depending upon the demand of the decision-maker.
3. Management accounting plays a special role in managing the affairs of the business by providing not only the conventional reports to the decision makers of an organization but also in taking necessary measures to ensure the supply of adequate information at right time to enable the decision-makers of the organization to address the challenges of the changing environment.
4. The element of intuition is managerial decision has not been completely eliminated. There is a tendency among business executives to use a short-cut approach to managerial problems rather than the lengthy process as required by the scientific analysis prescribed by management accounting.

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5. Traditionally, the job of management accountant in an organization as advocated by Williamson (2003), has evolved around the following major activities:
   - Accounting for product valuation and pricing
   - Policy formulation and planning
   - Decision making
   - Cost control

1.8 SUMMARY

- Management accounting is a segment of accounting that deals specifically with the accounting and reporting of information to management regarding the detailed operations of the company in order for decisions to be taken in various areas of business.
- A person can gain meaningful insights and conclusions about the firm with the help of analysis and interpretation of the information contained in financial statements.
- Budgeting is a means of coordinating activities with the co-operation of those who seek to achieve a common goal.
- Inflation accounting attempts to identify certain characteristics of accounting that tend to distort the reporting of financial results during periods of rapidly changing prices.
- Clear, informative, timely reports are essential management tools in reaching decisions that make the best use of a company's resources.
- Quantitative analysis methods allow managers to develop information from their financial database that is not, otherwise, available.
- Taxation plays an important role in the profitability of a commercial concern.
- Internal audit as a discipline of management accounting makes arrangements for performance appraisal of the company's various departments.
- To discharge the responsibility effectively, management accounting, therefore, has to carry out not only the activities like collection, processing, analysing and interpreting of the data but also communicating the resulting information to such internal parties who intend to use the same in their decision making process.
- Management accounting helps an organization in the process of management, which generally consists of activities like planning, organizing, evaluating and communicating.

- Financial planning is the process of deciding in advance the financial objectives, policies and procedures.
- Financial statement analysis is a growing and ever changing set of systems and procedures designed to provide decisions-makers with relevant information derived from the basic sources of data such as company financial statements and government and industry publications.
- Standard costs are predetermined targets against which actual results are evaluated.
- Marginal costing is a managerial technique that considers only variable cost in the additional output decisions.
- Budgetary control refers to a system of business control that uses budgets to control the major activities of business.
- Funds flow analysis attempts to highlight the causes of change in the financial condition of a business enterprise between two dates.
- Management reporting is considered an essential component of a well-designed planning and control system.
- In his new role, the management accountant will provide more opportunities to explore his potential in meeting the expectations of the stakeholders in an organization.
- A management accountant is responsible for devising and operating an accounting information system that is capable of collecting, processing, interpreting and communicating accounting information for internal users of the organization.

1.9 KEY WORDS

- **Management accounting:** It is a segment of accounting that deals specifically with the analysis and reporting of information to management about the operations of the organization with an objective to facilitate decision making.
- **Financial accounting:** It is a growing discipline which helps to regulate a system that is capable of recording, classifying and summarizing the mercantile transactions occurring in an organization.
- **Budgeting:** It refers to a systematic plan for the utilization of organizational resources.
- **Data processing:** It refers to the series of activities consisting of compilation, classification, tabulation and summarization that aims to make data information.

1.10 SELF ASSESSMENT QUESTIONS AND EXERCISES

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Short-Answer Questions

1. What is management accounting? How is it different from financial accounting?
2. Briefly discuss the scope of management accounting.
3. State the objectives and limitations of management accounting.

Long-Answer Questions

1. 'Management accounting is the presentation of accounting information in such a way as to assist the management in decision making.' Comment.
2. Discuss in detail the functions of management accounting.
3. Explain the tools of management accounting.
4. 'Management accounting can be viewed as management oriented accounting.' Comment.
5. Identify and examine the changing role of the management accountant in contemporary business.

1.11 FURTHER READINGS

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UNIT 2 FINANCIAL STATEMENTS ANALYSIS

Structure

2.0 Introduction
2.1 Objectives
2.2 Nature of Financial Statements
 2.2.1 Limitations of Financial Statements
 2.2.2 Meaning of Analysis
 2.2.3 Steps Involved in Financial Statements Analysis
 2.2.4 Techniques of Analysis
2.3 Comparative Financial Statements
2.4 Common Size Statement
2.5 Trend Analysis
2.6 Answers to Check Your Progress Questions
2.7 Summary
2.8 Key Words
2.9 Self Assessment questions and Exercises
2.10 Further Readings

2.0 INTRODUCTION

The fundamental, clear and definite understanding of financial statements is recognized as a prerequisite for an accurate, complete and relevant financial decision. However, this does not mean that decision makers like a business executive, commercial or investment banker, or investor, speculator, business counsellor, mercantile creditman, or financial analyst need to master themselves in the preparation of these statements. In fact, qualified financial accountants capable of preparing such statements are available almost everywhere in the world. But the unchallenged ability to interpret these financial statements intelligently and accurately are essential to understand the financial status and performance of a business.

In this unit, you will learn about some tools of financial statement analysis.

2.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the meaning, limitations, steps and techniques of financial statement analysis
- Explain the concept of comparative statement
- Discuss the preparation of common size statement
- Examine the method of trend percentage as a tool of financial statement analysis

2.2 NATURE OF FINANCIAL STATEMENTS

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Financial statements enable a reader not only to measure business results of an organization but also to assess its financial position; hence, they are generally predictive by nature. Such statements contain not only sufficient but also valuable information about the organization that would help managers in decision making. The nature of financial statements was admirably summarized on traditional grounds a number of years ago by the American Institute of Certified Public Accountants, 1936 in the following lines: *Financial statements are prepared for the purposes of presenting a periodical review or report by the management and deal with the status of the investment in the business and the results achieved during the period under review.*

Thus, financial statements are reporting instruments that provide a summary of the accounting data of an organization's business pertaining to a specific accounting period. The objectives of such statements are summarized below:

- To measure an organization's business results and assess its financial position;
- To present true and fair view of the business;
- To reveal implications of operating profit on the financial position of a concern;
- To provide sufficient and relevant financial information to various parties interested in financial statement analysis; and
- To serve as the basis for future planning and strategy.

Generally, financial statements refer to at least two statements which an organization prepares at the end of a given period of time. These statements are:

- Profit and loss accounts; and
- Balance sheet

In addition to the above-mentioned statements, many organizations prepare the following two financial statements in order to strengthen the accounting information system:

- **Profit and Loss Appropriation Account:** An account that shows the distribution of profit is known as profit and loss appropriation account. Generally this account has the same format, i.e., 'T' form, as is followed in case of profit and loss account. The current profit of the business (that is transferred from profit and loss account) along with the balance of profit, if any, of the previous year appear

on the credit side of the account. The debit side of the account shows appropriation transactions like dividend, income tax, general reserve, etc. A specimen of this account is given below:

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Profit and Loss Appropriation Account

	₹		₹
Proposed dividend	xxx	Balance at ……	xxx
Provision for income-tax	xxx	Profit (Transferred from P&L A/c)	xxx
General reserve	xxx		
Balance c/d	xxx		
	xxxx		xxxx

- Statement of Changes in Financial Position The statement of changes in financial position, often referred to as 'Funds Flow Statement', provides information about the flow of fund (working capital) during a particular period. It also provides information about the financial and investing activities of a business enterprise. Such a statement explains the cause of change in the financial position (balance sheet) from the beginning of the period to the end of the period.

Since the students need to possess knowledge about the nature and structure of profit and loss account and balance sheet before they analyse such statements for a given purpose, in the subsequent sections of this chapter an attempt has been made in this direction.

Profit and Loss Account

Profit and loss account reports the results of business activities for an accounting period. Such an account not only reveals the details of the income and expenditure of a business organization over a period of time but also compare them with each other with an objective to find the deviation which represents the amount of profit or loss for the period. If income exceeds expenditure the difference is called net profit and in case expenditure exceeds income, the difference is called net loss. Data concerning sales, cost of goods sold, returns and allowances, selling and distribution expenses and net income are normally presented in the profit and loss account. The profit and loss account sometimes is called income statement or the operating statement.

There is no specific proforma for the preparation of profit and loss account. However, the proforma given below is commonly used for this purpose:

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ESS BEE Company Ltd.
Profit and Loss Account
(*for the period ended ……..***)**

Dr. **Cr.**

Particulars	***Amount*** ₹	***Particulars***	***Amount*** ₹
To Purchases	xxx	By Sales	xxx
To Carriage	xxx	By Discount received	xxx
To Establishments	xxx	By Interest received	xxx
To Salaries and wages	xxx	By Commission	xxx
To Insurance	xxx	By Income on investment	xxx
To Printing & Stationery	xxx		
To Advertising	xxx		
To Distribution Charges	xxx		
To Discount	xxx		
To Audit Fee	xxx		
To Repairs	xxx		
To Depreciation	xxx		
To Provision or Reserves	xxx		
To Rent	xxx		
To Net profit	xxx		
(transferred to Capital account)	xxxx		xxxx

The above-given proforma of profit and loss is commonly used by Indian organizations. The name of the concern and the time period for which the account is prepared is written at the top of the account. The body of the account contains details about incomes and expenditures of the concern for the specific period. An accounting system consisting of accounting concepts and principles is used to identify, recognize and measure such incomes and expenditures.

As is evident from the above-mentioned proforma, profit and loss account is divided into two major categories—the left-hand side known as *debit* side and right-hand side called as *credit* side. The profit and loss account is nominal in character, therefore, all expenditures are debited and all incomes are credited. However, expenditure incurred for the future commonly known as *unexpired costs* (assets) like building, plant and machinery costs, land or investments are not reported in the profit and loss account. This reveals that only expired costs related to the current period like cost of goods sold, salaries, rent, and so on are shown in profit and loss account. In the same way, expenses related to the past periods have to be excluded from the profit and loss account. The same procedure is also applied to incomes. Accordingly, incomes received in advance and incomes received in respect of past periods are not included in the computation of profit for the current period, and therefore, are not shown in the profit and loss account.

Since the profit and loss account records transactions on the basis of accrual method, outstanding or accrued expenses and incomes relating to

the current period but not yet paid or received are to be reported in profit and loss account.

Balance Sheet

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The profit and loss account discussed above depicts the income and expenditure for a specific accounting period, but it fails to indicate the position of the organization in terms of its assets and liabilities. To present such an information, an accounting framework is required which is known as the *balance sheet*. The balance sheet is a statement of the financial position of an enterprise as at a given date which exhibits its assets, liabilities, capital, reserves and other account balances at their respective book values (ICAI, 1983).

Thus, balance sheet is a statement which discloses the financial status of an organization consisting of the values assigned to its assets, liabilities, and owner's equity, at a specific time. It contains two sides, viz., liabilities and assets.

Liabilities denote the amount which a business owes to others on different accounts. It represents claims of creditors and equity of the owners. The liabilities are usually divided into three major categories:

- Current liabilities represent short-term financial obligations which are expected to be paid within the coming year or the normal operating cycle. Sundry creditors, bills payable and outstanding expenses are the best examples of such liabilities.
- Long-term liabilities are liabilities that are not expected to be repaid within the coming year but are of the long-term nature. Thus, it includes debts not falling due until more than a year from the balance sheet date.
- Owner's equity represents the amount of liabilities for which owners of a business have claim. It includes share capital and accumulated resources.

Assets are the material things or possessions or properties of business including the amount due to it from others. Assets are usually classified into three major categories:

- Current assets represent cash plus those assets that are expected to be converted into cash or consumed during the year or normal operating cycle, e.g., stock, sundry debtors, bills receivable, etc.
- Fixed asssets are those assets which are to be used in business operation over a relatively long period of time. Such assets are incidental to production such as land and building, plant and machinery, furniture and fittings, etc.
- Intangible assets also known as fictitious assets are not represented by any tangible possession or property. They are debit balances of certain accounts which are not yet written off such as preliminary expenses, patents, goodwill, etc.

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Thus, the liabilities side show sources wherefrom funds were obtained while assets side describes the way in which the funds were utilized.

For a clear understanding of the balance sheet, one must be well versed with the concept of business entity which says business has got its own individuality as distinguished from those persons who own, control or otherwise are associated with the business. Such a concept advocates that the organization is liable to those who have advanced money to it, that is, its liabilities are the sums owed by the business to the internal parties (owners) and external parties (creditors) who had advanced money to it. Similarly, its assets would represent the properties and services owned or brought by the business with the funds advanced. Thus, the balance sheet is a representation of the accounting equation:

Assets = Liabilities + Capital

A proforma of the balance sheet is given below:

ESS BEE Co. Ltd.
Balance Sheet as on …

Liabilities		***Amount*** ₹	***Assets***	***Amount*** ₹
Capital			*Fixed Assets*	
Issued capital	xxx		Land	xxx
Retained profits	xxx		Building	xxx
Owner's Equity		xxxx	Machinery	xxx
Loans		xxx	*Current Assets*	
Trade Creditors		xxx	Stock	xxx
Overdraft		xxx	Debtors	xxx
Taxation		xxx	Cash	xxx
		xxxx		xxxx

2.2.1 Limitations of Financial Statements

Financial statements suffer from the following limitations:

- Since financial statements are historical in nature, they contain financial data about the past and fail to reflect on the future.
- Financial statements fail to throw light on non-monetary facts of the business despite the fact that they play an important role in the profitability of the concern. Facts like competition, conflict, loyalty, etc., directly influence the concern's profitability but cannot be expressed in monetary units, and therefore, are ignored in financial statements.
- Financial statements are prepared for a particular financial period, and therefore, such statements are essentially interim reports which do not depict the exact business position. Such a position can be only known at the time of closure of the business.

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- A financial statement is as nearly as the accountant can make it so. Therefore, such statements are influenced by his personal judgements which definitely affect the quality and utility of the statements.
- Financial statements fails to reflect the true and fair view of the business as the preparation of the statements is governed by various accounting concepts and conventions which suffer from many drawbacks. For example, assets are to be recorded at cost rather than their realisable value which definitely hides the real positions of the concern.

2.2.2 Meaning of Analysis

Like lines in the palm or horoscope, financial statements can be studied, puzzled over, and scrutinized (Woelfel, 1980). The analysis of such statements provide valuable information for managerial decisions. Financial statement is—as nearly as the financial executive can make it so—simply a report of facts. The utility of the statement does not lie in the amount of information it contains but in the expertise and the skill of the analyst to analyse and interpret the information in the statement in order to get the story behind the facts—to read between the lines. Financial statement does not speak anything in and of itself. It merely contains financial data about business events. The user gains meaningful insights and conclusions about the firm only through his own analysis and interpretation of the information in the statements (Woelfel, 1908).

Financial statement analysis involves a systematic and careful examination of the information contained in the financial statements with a definite purpose. It is a detailed inquiry into financial data to evaluate an organization's performance, future risks and potential. It attempts to determine the significance and meaning of the business information as depicted by financial statements so that prospects for future earnings, ability to pay interest and debt maturities (both current and long-term) and profitability of a sound dividend policy may be forecast. According to Myer, 1969 Financial statement analysis is largely *a study of relationships among the various financial factors in a business, as disclosed by a single set of statements and study of these factors as shown in a series of statements.*

Thus, financial statement analysis is a process of analysing the financial data in order to judge the profitability and financial position of an organization. It is the evaluation of the economic and financial data presented in the financial statements for making decisions and maintaining control.

2.2.3 Steps Involved in Financial Statements Analysis

The process of financial statement analysis consists of the following six steps:

- determination of scope and objectives of analysis;
- study of financial statements;

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- collection of relevant information;
- rearrangement of the data;
- analysis of data by analytical techniques; and
- interpretation, presentation and preparation of reports.

2.2.4 Techniques of Analysis

Over the past few decades a number of techniques have been developed for the analysis of financial statements. The selection of appropriate analytical technique generally depends upon the purpose of the analysis. Usually analysts prefer to use such techniques in combination to ensure better results. The commonly used techniques are:

- comparative financial statement;
- common-size statement;
- trend analysis;
- ratio analysis;
- fund flow statements; and
- cash flow statements

In the subsequent sections of this unit, an attempt is made to discuss in detail the first three techniques *i.e.*, comparative financial statement, common-size statement, and trend analysis. However, the last three techniques *i.e.*, ratio analysis, fund flow statement and cash flow statement have been discussed in detail in the subsequent units.

Check Your Progress

1. Mention the statements apart from profit and loss accounts and balance sheet which are prepared to strengthen the accounting information system.
2. State the accounting equation whose representation is the balance sheet.
3. Mention some of the factors which influence profitability but are ignored in financial statements.

2.3 COMPARATIVE FINANCIAL STATEMENTS

Any financial statement that reports the comparison of data for two or more consecutive accounting periods is known as comparative financial statement. Commenting on the nature of comparative financial statements Foulke, 1961 states that such statements which basically reveal the financial position of the business are designed in such a form as to provide time prospective to

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the consideration of various elements of financial position embodied in such statements.

In fact, comparative financial statements highlight trends and establish relationship between items that appear on the same row of the statement. Such statements disclose changes in the items of the statement with time in both rupees and percentage. Each item (such as debtors) on a row for one fiscal period is compared with the same item in a different period. The analyst calculates the absolute changes—the difference between the figures of one year and the next—and also the percentage change from one year to the next, using the earlier year as the base year. Much valuable information is obtained from financial statements in this manner. The comparative study helps an analyst to identify and examine the key factors which have affected profitability or the financial position of the organization.

Illustration 2.1: From the following balance sheet of Saher Ltd. prepare a comparative balance sheet and comment on the financial position of the concern.

Saher Ltd.
Balance Sheet

Liabilities	*2011* ₹	*2012* ₹	*Assets*	*2011* ₹	*2012* ₹
Equity shares	2,20,000	2,50,000	Buildings	1,40,000	1,70,000
Debentures	1,00,000	1,20,000	Machinery	1,20,000	1,50,000
Reserves and surplus	60,000	80,000	Furniture	60,000	40,000
Sundry creditors	40,000	25,000	Sundry debtors	40,000	60,000
Bills payable	35,000	40,000	Marketing Securities	55,000	30,000
Outstandings	20,000	–	Stock	40,000	55,000
(Misc. exp)			Cash balances	20,000	10,000
	4,75,000	5,15,000		4,75,000	5,15,000

Solution

Comparative Balance Sheet
(*As on 31st December, 2011 and 2012*)

Particulars	*31st December*		*Increase or Decrease in Amount* ₹	*Increase or Decrease in Percentage* ₹
	2011 ₹	*2012* ₹		
Assets				
A. *Current Assets*				
Sundry debtors	40,000	60,000	+ 20,000	+ 50.00
Marketable securities	55,000	30,000	– 25,000	– 45.45
Stock	40,000	55,000	+ 15,000	+ 37.50
Cash balances	20,000	10,000	– 10,000	– 50.00
Total (A)	1,55,000	1,55,000	–	–

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B. *Fixed Assets*				
Buildings	1,40,000	1,70,000	+ 30,000	+ 21.43
Machinery	1,20,000	1,50,000	+ 30,000	+ 25.00
Furniture	60,000	40,000	– 20,000	– 33.33
Total (B)	3,20,000	3,60,000	+ 40,000	+ 12.50
Total Assets (A + B)	4,75,000	5,15,000	40,000	8.42
Liabilities				
C. *Current Liabilities*				
Sundry creditors	40,000	25,000	– 15,000	– 37.50
Bills payable	35,000	40,000	+ 5,000	+ 14.29
Outstanding (Misc. exp)	20,000	–	– 20,000	– 100.00
Total (C)	95,000	65,000	– 30,000	– 31.58
D. *Long-term Liabilities*				
Equity shares	2,20,000	2,50,000	+ 30,000	+ 13.64
Debenture	1,00,000	1,20,000	+ 20,000	+ 20.00
Reserves and surplus	60,000	80,000	+ 20,000	+ 33.33
Total (D)	3,80,000	4,50,000	+ 70,000	+ 18.42
Total Liabilities (C + D)	4,75,000	5,15,000	+ 40,000	+ 8.42

Interpretation

The analysis of the above comparative balance sheet (*see* Illustration 2.1) reveals that the monetary balance in each account has increased between the end of 2011 and 2012 with an exception of marketable securities, cash balances, furniture, sundry creditors and outstanding. The significant changes which have occurred in specific balance sheet accounts during the two-year period are:

- There is 50 per cent increase in sundry debtors, 37.5 per cent increase in stock, 45.45 per cent decrease in marketable securities and 50 per cent decrease in cash balances. Slower paying customers and/or slower moving merchandise might be responsible for the changes.
- There has been no change in the amount of current assets during the two periods but current liabilities have decreased by 31.58 per cent. This change has contributed to the liquidity of the company.
- There has been increase in share capital and debentures by 13.64 per cent and 20 per cent, respectively. All this might be due to fresh issue of shares and debentures.
- The increase in fixed assets during the two periods has been 12.5 per cent. The increase in fixed assets does not sound financially sound when compared with the amount of current assets that has remained constant during the period under study.

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Illustration 2.2: The income statements of a concern are given for the years ending on 31st December, 2011 and 2012. You are required to prepare a comparative income statement and interpret the changes.

Income Statements for the Year Ending 2011 and 2012

Particulars	*2011* `	*2012* `
Sales	6,50,000	7,25,000
Cost of sales	4,25,000	5,00,000
Gross Profit	2,25,000	2,25,000
Operating Expenses:		
Selling & Distribution Exp.	60,000	75,000
General Expenses	25,000	40,000
Total Operating Expenses	85,000	1,15,000
Net profit during the year	1,40,000	1,10,000

Solution

Comparative Income Statement

(for the year ended 31st December, 2011 and 2012)

Particulars	*31st December*		*Increase or Decrease in Amount* ₹	*Increase or Decrease in Percentage* ₹
	2011 ₹	*2012* ₹		
Net sales	6,50,000	7,25,000	+ 75,000	+ 11.54
Less: Cost of goods sold	4,25,000	5,00,000	+ 75,000	+17.65
Gross Profit	2,25,000	2,25,000	–	–
Operating Expenses:				
Selling & distribution expenses	60,000	75,000	+ 15,000	+ 25.00
General Expenses	25,000	40,000	+ 15,000	+ 60.00
Total Operating Expenses	85,000	1,15,000	+ 30,000	+ 35.29
Operating Profit	1,40,000	1,10,000	– 30,000	– 21.43

Interpretation

A cursory study of the above comparative income statement (*see* Illustration 2.2) reveals the following:

- There is significant change in the operating profit in comparison to other items of the income statement as it has declined by 21.43 per cent during the period under study.
- Although the amount of net sales has increased by 11.54 per cent during the period under study yet the cost of goods sold has increased by 17.65 per cent that has neutralized the benefit gained from the increase in sales. Consequently, the amount of gross profit has remained constant.

- The increase in operating expenses during the period which has been registered an increase of 35.29 per cent is due to increase in selling and distribution, and general expenses which have registered an increase of 25 per cent and 60 per cent, respectively during the period.

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2.4 COMMON SIZE STATEMENT

Financial statements that depict financial data in the shape of vertical percentage are known as common size statements. Since such statements provide the readers with a vertical analysis of the items of profit and loss account and balance sheet, the values of the items are converted into a common unit by expressing them as a percentage of a key figure in the statement. Therefore, the total of financial statement is reduced to 100 and each item of the statement is shown as a component of the whole. For example, in profit and loss account, the value of each item is expressed as a percentage of sales. In the same way, the assets and liabilities can be shown as percentage of total assets and total liabilities, respectively, in a common-sized balance sheet. Since in common size statements each monetary item of the financial statement is expressed as a percentage of the sum total of which that item is a part, such an attempt is referred to as common size statement. Consequently, such statements not only show the relative significance of the items contained in the financial statements but also facilitates comparison. Common size statements are recognized as valuable management tool as they reveal both efficiencies and inefficiencies that are otherwise difficult to identify. However, a common size statement is especially useful when data for more than one year are used.

Illustration 2.3: The balance sheets of Shaheen Ltd. are given for the year 2011 and 2012. Convert them into common-sized balance sheet and interpret the changes.

Balance Sheet

Liabilities	***2011*** ₹	***2012*** ₹	***Assets***	***2011*** ₹	***2012*** ₹
Equity share	1,46,800	1,91,000	Buildings	1,80,000	2,00,000
Capital reserve	50,000	70,000	Plant and Machinery	40,000	55,000
Revenue reserve and surplus	20,000	30,000	Furniture	10,000	20,000
Trade creditors	30,000	40,000	Freehold Property	20,000	12,000
Bills payable	80,000	60,000	Goodwill	25,000	30,000
Bank overdraft	90,000	80,000	Cash balance	25,000	20,000
Provisions	30,000	20,000	Sundry Debtors	30,000	35,000
			Inventories	70,000	57,000
			Investment (temporary)	36,500	42,000
			Bills receivable	10,300	20,000
	4,46,800	4,91,000		4,46,800	4,91,000

NOTES

Solution

Common-size Balance Sheet
(*as on 31st December 2011 and 2012*)

	2011 Amount ₹	*Percentage*	*2012 Amount ₹*	*Percentage*
Assets				
A. *Current Assets*:				
Cash balances	25,000	5.59	20,000	4.07
Sundry debtors	30,000	6.71	35,000	7.13
Inventories	70,000	15.67	57,000	11.60
Investments (Temporary)	36,500	8.17	42,000	8.55
Bills receivable	10,300	2.30	20,000	4.08
Total (A)	1,71,800	38.44	1,74,000	35.43
B. *Fixed Assets:*				
Building	1,80,000	40.29	2,00,000	40.75
Plant and machinery	40,000	8.95	55,000	11.20
Furniture	10,000	2.24	20,000	4.07
Freehold property	20,000	4.48	12,000	2.44
Goodwill	25,000	5.60	30,000	6.11
Total (B)	2,75,000	61.56	3,17,000	64.57
Total Assets (A + B)	4,46,800	100.00	4,91,000	100.00
Liabilities				
C. *Current Liabilities:*				
Trade creditors	30,000	6.71	40,000	8.15
Bills payable	80,000	17.91	60,000	12.22
Bank overdraft	90,000	20.14	80,000	16.29
Provisions	30,000	6.71	20,000	4.07
Total (C)	2,30,000	51.47	2,00,000	40.73
D. *Long-term Liabilities:*				
Equity share	1,46,800	32.86	1,91,000	38.90
Capital reserve	50,000	11.19	70,000	14.26
Revenue reserve and surplus	20,000	4.48	30,000	6.11
Total (D)	2,16,800	48.53	2,91,000	59.27
Total Liabilities (C + D)	4,46,800	100.00	4,91,000	100.00

Interpretation

- The study of the above common size balance sheet (see Illustration 2.3) shows that 61.56 per cent of the total assets in 2011 were fixed. This percentage increased to 64.57 per cent in 2012. If the organization requires considerable investment in fixed assets, these percentages might be acceptable. However, if the organization needs liquid assets, the interested parties might have cause to be concerned about the decreasing trend of liquidity.

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- There has been a major shift from the use of creditors' provided funds to the use of owner's equity funds. In 2011, external equity (current liabilities) and owner's equity (long-term liabilities) accounted for 51.47 per cent and 48.53 per cent, respectively, of the total equities. In 2012, these percentages changed to 40.73 per cent for external equities and 59.27 per cent for owners' equity. These changes indicate that the organization has used more internal sources than external sources in the generation of funds for the business during the period under study.
- The organization has not only succeeded in reducing its current liabilities from 51.47 per cent in 2011 to 40.73 per cent in 2012 of their respective total equities but it has also increased the percentage of its revenue reserve and surplus from 4.48 per cent in 2011 to 6.11 per cent in 2012 of their respective total equities.

Illustration 2.4: From the income statement given below, you are required to prepare a common-sized Income Statement.

Income Statements
(for the year ending 31st Dec, 2011 & 2012)

Particulars	*2011* ₹	*2012* ₹
Sales	1,40,000	1,65,000
Less: Cost of goods sold	85,000	1,05,000
Gross Profit	55,000	60,000
Operating Expenses:		
Selling & Distribution expenses	12,000	16,000
Administrative expenses	10,000	11,000
Total Operating Expenses	22,000	27,000
Net income before tax	33,000	33,000
Income-tax (40%)	13,200	13,200
Net Income	19,800	19,800

Solution

Common Size Income Statement
(*for the year ending 2011 and 2012*)

Particulars	*2011*		*2012*	
	Amount ₹	*Percentage*	*Amount* ₹	*Percentage*
Sales	1,40,000	100.00	1,65,000	100.00
Less: Cost of sales	85,000	60.72	1,05,000	63.63
Gross Profit	55,000	39.28	60,000	36.37
Operating Expenses:				
Selling & distribution expenses	12,000	8.57	16,000	9.70

Administrative expenses	10,000	7.14	11,000	6.67
Total Operating Expenses	22,000	15.71	27,000	16.37
Net Income before tax	33,000	23.57	33,000	20.00
Income-tax (40%)	13,200	9.42	13,200	8.00
Net Income after tax	19,800	14.15	19,800	12.00

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Interpretation

The study of the above-mentioned common size income statement (*see* Illustration 2.4) reveals the following facts:

- Out of every rupee of sales 60.72 per cent in 2011 and 63.63 per cent in 2012 accounted for cost of goods sold.
- The percentage ratio of gross profit to sales was 39.28 per cent in 2011 and the same was reduced to 36.37 per cent in 2012.
- The operating expenses increased from 15.71 per cent of sales in 2011 to 16.37 per cent in 2012. All this reduced the percentage ratio of net income after tax to sales from 14.15 per cent in 2011 to 12 per cent in 2012.

In the ultimate analysis, it can be concluded that the operating efficiency of the organization has not been satisfactory during the period under study.

Illustration 2.5: Following are the Balance Sheets of X Co. Ltd. and Y. Co. Ltd. as on 31.12.2012.

Particulars	*X Co.Ltd.*	*Y Co.Ltd.*
Assets		
Cash	27	72
Sundry debtors	220	226
Stock	100	174
Prepaid expenses	11	21
Other current assets	10	21
Total Current Assets	368	514
Fixed Assets (Net)	635	513
Total	1,003	1,027
Liabilities		
Sundry creditors	42	154
Others	78	62
Total Current Liabilities	120	216
Fixed liabilities	225	318
Total liabilities	345	534
Capital	658	493
Total	1,003	1,027

From the above data, prepare a common size statement and make two comments you deem fit.

(*B.Com, Bangalore University*)

NOTES

Solution

Common Size Balance Sheet
(as on 31st December 2012)

Particulars	*X Co. Ltd.*		*Y Co. Ltd.*	
	Amount (₹ in Lakhs)	*Percentage*	*Amount (₹ in Lakhs)*	*Percentage*
Assets				
A. *Current Assets:*				
Cash	27	2.69	72	7.01
Sundry debtors	220	21.93	226	22.01
Stock	100	9.97	174	16.94
Prepaid expenses	11	1.10	21	2.04
Others	10	1.00	21	2.04
Total (A)	368	36.69	514	50.04
B. *Fixed Assets:*	635	63.31	513	49.96
Total (B)	635	63.31	513	49.96
Total Assets (A + B)	1,003	100.00	1,027	100.00
Liabilities				
C. *Current Liabilities:*				
Sundry creditors	42	4.19	154	14.99
Others	78	7.78	62	6.04
Total (C)	120	11.97	216	21.03
D. *Long-term Liabilities:*				
Fixed liabilities	225	22.43	318	30.97
Capital	658	65.60	493	48.00
Total (D)	883	88.03	811	78.97
Total Liabilities (C + D)	1,003	100.00	1,027	100.00

Interpretation

The study of the above common size balance sheet (*see* Illustration 2.4) brings to light the following facts:

- The balance sheet indicates that 63.31 per cent of total assets of the X Co. Ltd. were fixed whereas the same was 49.96 per cent for Y Co. Ltd.
- The current liabilities of X Co. Ltd. were 11.97 per cent of the total liabilities and the said percentage for Y Co. Ltd. was 21.03. Both the companies have used more equity capital as compared to debt, and therefore, have failed to take benefit of trading on equity.

Comparative Statement Versus Common Size Statement

Although both statements aims to help managers in decision making yet they differ both in terms of format and approach. The major differs between the two statements are summarized in Exhibit 2.1.

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Exhibit 2.1 Comparison of Comparative Statement and Common Size Statement

Areas of Comparison	*Comparative Statement*	*Common-size Statement*
Approach	• Discloses changes in the items of a financial statement over time in both rupees and percentage form.	• Converts items of a financial statement to a common unit by expressing them as a percentage of a key figure in the statement.
Type of Analysis	• Since it studies the same item related to two consecutive periods, it is recognized as horizontal analysis.	• As the study involves a single financial period, it is known as vertical analysis.
Popularity	• Highly popular among the business firms.	• Few firms prefer to use this analysis; hence, it has limited application.
Requirements	• Calls for the financial statements related to two consecutive financial periods.	• Needs financial statements of a single financial period.
Significance of Items	• Fails to indicate the significance of an item of a financial statement as a component of a key figure in the statement.	• Highlights the significance of each item of a financial statement as a component of a key figure in the statement.

2.5 TREND ANALYSIS

Trend analysis is recognized as one of the important tools of financial data analysis. Such an analysis, in fact, calls for the computation of percentage changes for different variables over a long period with an aim to have a comparative study of the variables. The trend percentages help the analyst to study the changes that have occurred during the period under study. Such an analysis indicates the progress of business by showing ups and downs in its activities. The calculation of trend percentages involves the following steps:

- Selection of base year;
- Assigning a weight of 100 to the value of the variable of base year; and
- Expressing the percentage change in the value of variable from base year to the study year as shown below.

Year	*Sales*	*Percentage (+) Increase or (–) Decrease*
2006	20,000	100 (Base year)
2007	35,000	175
2008	28,000	140
2009	30,000	150
2010	35,000	175
2011	14,000	70
2012	22,000	110

A trend for a single financial item is seldom very informative. A comparison of trends for related items often help the analyst in perfect understanding of the business facts as is clear from the below-mentioned comparative balance sheet.

Comparative Balance Sheet

Assets	*2007* ₹	*2008* ₹	*2009* ₹	*Trend Percentage (Base Year-2001)*		
				2007	*2008*	*2009*
A. *Current Assets:*						
Inventory	20,000	30,000	25,000	100	150	125
Debtors	30,000	50,000	60,000	100	167	200
Cash balances	20,000	35,000	30,000	100	175	150
Total (A)	70,000	1,15,000	1,15,000	100	164	164
B. *Fixed Assets:*						
Building	2,50,000	3,00,000	3,00,000	100	120	120
Plant	1,25,000	1,50,000	1,60,000	100	120	128
Investment	80,000	1,00,000	1,20,000	100	125	150
Total (B)	4,55,000	5,50,000	5,80,000	100	121	127
Total Assets (A + B)	5,25,000	6,65,000	6,95,000	100	127	132

Illustration 2.6: Calculate the trend percentage from the following figures of X Ltd. taking 2008 as the base and interpret them.

(₹ *in lakhs*)

Year	*Sales*	*Stock*	*Profit Before Tax*
2008	1,881	709	321
2009	2,340	781	435
2010	2,655	816	458
2011	3,021	944	527
2012	3,768	1,154	672

(*M.Com., Rajasthan*)

Solution

Trend Percentages

Year	*Sales Rupees in Lakhs*	*Stock Rupees in Lakhs*	*Profit Before Tax Rupees in Lakhs*	*Trend Percentage*		
				Sales	*Stock*	*Profit Before Tax*
2008	1,881	709	321	100	100	100
2009	2,340	781	435	124	110	136
2010	2,655	816	458	141	115	143
2011	3,021	944	527	161	133	164
2012	3,768	1,154	672	200	162	209

Interpretation

The study of the above-given statement (*see* Illustration 2.6) of trend percentage reveals that:

- The sales of the firm has continuously increased over a period of five years commencing from 2008. However, there has been a substantial increase in the amount of sales in the year 2012 when it increased by 39 per cent.
- The trend of stock is also upwards. Although the increase in this item has been constant yet in 2012 the increase has been exceptionally high.
- The profits of the firm has increased at a much higher rate in comparison to increase in sales and stock during the period under study.

The overall analysis of the financial items indicated that the organization is doing well, and therefore, its financial position is bound to be good.

Illustration 2.7: You are given the following common size percentage of AB Co. Ltd. for 2011 and 2012.

	2011	*2012*
Inventory	5.20	5.83
Debtors	10.39	?
Cash	?	7.35
Machinery	49.35	45.35
Building	27.27	29.59
Creditors	20.78	?
Overdraft	?	10.81
Total Current Liabilities	31.17	?
Capital	51.95	49.67
Long-term loan	16.88	17.91
Total Liabilities	3,85,000	4,63,000

From the above information, compute the missing common size percentages. Also calculate the value of all items of assets and liabilities.

Solution

Common Size Balance Sheet
(*as on 31st December 2011 and 2012*)

	2011		*2012*	
	Amount ₹	*Percentage*	*Amount* ₹	*Percentage*
Assets				
A. *Current Assets:*				
Inventory	20,000	5.20	27,000	5.83
Debtors	40,000	10.39	55,000	11.88(iii)
Cash	30,000	7.79(i)	34,000	7.35
Total A	90,000	23.38	1,16,000	25.06
B. *Fixed Assets:*				
Machinery	1,90,000	49.35	2,10,000	45.35
Building	1,05,000	27.27	1,37,000	29.59
Total B	2,95,000	76.62	3,47,000	74.94
Total Assets (A + B)	3,85,000	100.00	4,63,000	100.00

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Liabilities				
C. *Current Liabilities:*				
Creditors	80,000	20.78	1,00,000	21.59
Overdraft	40,000	10.39(ii)	50,000	10.81
Total (C)	1,20,000	31.17	1,50,000	32.40
D. *Long-term Liabilities:*				
Capital	2,00,000	51.95	2,30,000	49.68
Loan	65,000	16.88	83,000	17.92
Total (D)	2,65,000	68.83	3,13,000	67.60
Total Liabilities (C + D)	3,85,000	100.00	4,63,000	100.00

Note: Calculations have been made to the nearest rupee

(i) Calculation of percentage of cash for 2011

Cash = 23.38* – 15.59**
= 7.79
* Current asset = Total asset – Fixed asset
= 100 – 76.62 = 23.38
** Inventory + Debtors = 5.20 + 10.39 = 15.59

(ii) Calculation of percentage of overdraft for 2011

Total current liabilities – Creditors
31.17 – 20.78 = 10.39

(iii) Calculation of percentage of Debtors for 2012

Debtors = 25.06* – 13.18 = 11.88
* Current assets = Total assets – Fixed assets = 100 – 74.94 = 25.06

Check Your Progress

4. What do comparative financial statements highlight?
5. Which out of the following two is called vertical analysis: comparative statements or common-size statement?
6. Mention the steps in the calculation of trend percentages.

2.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Apart from profit and loss accounts and balance sheet, many organizations prepare the Profit and Loss Appropriation Account and Statement of Changes in Financial Position to strengthen the accounting information system.
2. The balance sheet is a representation of the accounting equation:

   Asset = Liabilities + Capital

3. Facts like competition, conflict, loyalty, etc., directly influence the concern's profitability cannot be expressed in monetary units, and therefore, are ignored in financial statements.
4. Comparative financial statements highlight trends and establish relationship between items that appear on the same of the statement.
5. As the common-size statement involves a single financial period, it is known as vertical analysis.
6. The calculation of trend percentages involves the following steps:
   - Selection of base year
   - Assigning a weight of 100 to the value of the variable of base year, and
   - Expressing the percentage change in the value of variable from base year to the study year.

2.7 SUMMARY

- The fundamental, clear and definite understanding of financial statements is recognized as prerequisite for an accurate, complete and relevant financial decision.
- Financial statements are the instrumental panels of a business which provide a summary of the accounts of a business organization.
- An account that shows the distribution of profit is known as profit and loss appropriation accounts.
- The statement of changes in financial position often referred to as the funds flow statement, provides information about the flow of fund (working capital) during a particular period.
- Profit and loss account reports the results of business activities for an accounting period.
- Balance sheet is a statement which discloses the financial status of the enterprise, consisting of the values assigned to its assets, liabilities and owner's equity, at a specific time.
- Liabilities denote the amount which a business owes to others on different accounts.
- Current liabilities represent short-term financial obligations which are expected to be paid within the coming year or the normal operating cycle.
- Long-term liabilities are liabilities that are not expected to be repaid within the coming year but are long term by nature.
- Owner's equity represents the amount of liabilities for which the owners of a business have claim.

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- Assets are material things or possessions or properties of business including the amount due to it from others.
- Current assets represent cash plus those assets that are expected to be converted into cash or consumed during the year or normal operating cycle, e.g., stock, sundry debtors, bills receivable, etc.
- Fixed assets are those assets which are to be used in business operation over a relatively long period of time.
- Intangible assets also known as fictitious assets are not represented by any tangible possession or property.
- Financial statement analysis involves a systematic and careful examination of the information contained in the financial statements with a specific purpose.
- Comparative financial statement reports comparing data of two or more consecutive accounting periods is known as comparative financial statement.
- Common size statements depicting financial data in the shape of vertical percentage are known as common size statements.
- Trend analysis which is one of the important tools of analysing financial data computes the percentage changes for different variables over a long period and then makes a comparative study of them.

2.8 KEY WORDS

- **Financial statements:** It refers to the reporting instruments that provide a summary of the accounting data of an organization's business pertaining to a specific accounting period.
- **Financial statement analysis:** It involves a systematic and careful examination of the information contained in the financial statements with a definite purpose.
- **Comparative financial statement:** It refers to any financial statement that reports the comparison of data for two or more consecutive accounting periods.
- **Common size statements:** It refers to the financial statements that depict financial data in the shape of vertical percentage.
- **Trend analysis:** It is a tool of financial statement analysis which calls for the computation of percentage changes for different variables over a long period with an aim to have a comparative study of the variables.

2.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is the nature of financial statements. What are the limitations of such statements?
2. Distinguish between horizontal and vertical analyses of financial statement data.
3. Define common size financial statements and explain their usefulness during financial statement analysis.
4. Why might it be unwise to predict a firm's financial future based on trends derived from historical financial information?
5. What are the steps involved in financial statement analysis?
6. Discuss the various techniques of financial statement analysis.
7. What do you understand by comparative financial statements? What information is required to prepare a comparative balance sheet.

Long-Answer Questions

1. Write short notes on:
   (a) Comparative financial statements
   (b) Trend analysis
   (c) Qualifications of financial analyst
2. Explain the procedure of preparing a common size balance sheet.
3. The following are the balance sheets of a concern as on 31st December, 2011 and 2012.

Liabilities	*2011* ₹	*2012* ₹	*Assets*	*2011* ₹	*2012* ₹
Sundry creditors	55,000	83,000	Cash	25,000	18,000
Bills payable	20,000	16,000	Sundry debtors	1,60,000	2,00,000
Provision for taxation	40,000	50,000	Bills receivable	20,000	30,000
Proposed dividend	42,000	50,000	Stock in trade	77,000	1,09,000
6% Debentures	1,50,000	1,00,000	Machinery	80,000	2,00,000
General reserve	40,000	70,000	Building	2,00,000	1,70,000
Profit and loss A/c	30,000	48,000	Goodwill	1,15,000	90,000
Capital	3,00,000	4,00,000			
Total	6,77,000	8,17,000		6,77,000	8,17,000

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Prepare a comparative balance sheet of the concern and study its financial position.

4. From the following information prepare a comparative statement and make brief comments

Income Statements
(*for the year ended 31st March 2011 and 2012*)

Particulars	***2011*** `	***2012*** `
Sales	2,80,000	3,10,000
Less: Cost of goods sold	1,92,000	2,22,000
Gross Profit	88,000	88,000
Less: Administrative expenses	15,000	12,000
Selling & distribution expenses	18,000	18,000
Total Operating Expenses	33,000	30,000
Net income before tax	55,000	58,000
Less: Tax (40%)	22,000	23,200
Net Income after Tax	33,000	34,800

5. Convert the following balance sheets into common size balance sheet and make brief comments

Balance Sheets
(*as on 31st March 2011 and 2012*)

Liabilities	***2011*** ₹	**2012** ₹	***Assets***	**2011** ₹	**2012** ₹
Share capital	5,00,000	6,50,000	Machinery	2,80,000	3,20,000
6% Debentures	3,40,000	2,00,000	Building	3,50,000	3,50,000
Sundry creditors	1,60,000	67,000	Investment	2,40,000	2,65,000
Provision for doubtful debts	4,500	3,000	Goodwill	70,000	55,000
Profit & loss A/c	75,500	1,65,000	Bank balance	40,000	30,000
			Inventory	60,000	40,000
			Bills receivable	40,000	25,000
	10,80,000	10,85,000		10,80,000	10,85,000

6. Following income statements of a business are given for the years ending 31st December, 2011 and 2012. Prepare a common size statement and make comments on the business results.

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Income Statements
(*for the years ending on* 31*st Dec*, 2011 *and* 2012)

Particulars	*2011* `	*2012* `
Gross sales	7,20,000	8,40,000
Sales returns & allowances	40,000	50,000
Net Sales	6,80,000	7,90,000
Cost of goods sold	5,00,000	5,80,000
Gross Profit from Sales	1,80,000	2,10,000
Operating Expenses		
Selling Expenses:		
Advertising expenses	10,000	12,000
Sales salaries	12,000	16,000
Delivery expenses	7,000	5,000
Depreciation expenses	10,000	16,000
Total Selling Expenses	39,000	49,000
General and Administrative Expenses:		
Office salaries	50,000	75,000
Insurance	20,000	35,000
Depreciation	5,000	16,000
Bad debts	3,000	12,000
Total General and Administrative Expenses	78,000	1,38,000
Total Operating Expenses	1,17,000	1,87,000
Operating Income	63,000	23,000

2.10 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 3 RATIO ANALYSIS

NOTES

Structure

3.0 Introduction
3.1 Objectives
3.2 Ratio Analysis: Meaning
3.3 Classification of Ratios
  3.3.1 Liquidity Ratios
  3.3.2 Leverage or Solvency Ratios
  3.3.3 Profitability Ratios
  3.3.4 Dupont Chart
  3.3.5 Activity or Turnover Ratios
3.4 Construction of Balance Sheet
3.5 Answers to Check Your Progress Questions
3.6 Summary
3.7 Key words
3.8 Self Assessment Questions and Exercises
3.9 Further Readings

3.0 INTRODUCTION

The preceding chapter examined not only the nature and significance of financial statements in measuring financial performance of an organization but also the application of the data contained in the statements for managerial decisions. This chapter continues financial statement analysis by focusing on financial ratios. Ratio analysis is one of the popular tools of financial statement analysis. Such an analysis aims to reduce the large number of items involved to a relatively small set of readily comprehended and economically meaningful indicators. However, given the large number of ratios available, it is difficult to discern the inter-relationships among them required for a comprehensive understanding of the entity being analyzed. What is required is an integrated system of financial ratios which will incorporate the essential ratios and highlight the inter-relationships among them.

3.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of ratio analysis
- Discuss the classification of ratios
- Describe the liquidity, solvency, turnover, profitability ratios and Dupont chart
- Examine the construction of balance sheet from ratios

3.2 RATIO ANALYSIS: MEANING

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In simple words, a ratio is the quotient formed when one magnitude is divided by another measured in the same unit. A ratio is defined as *the indicated quotient of two mathematical expressions* and as *the relationship between two or more things*. Usually the ratio is stated as a percentage, *i.e.,* distribution expenses might be stated as 20 per cent of sales. Often, however, the ratio is expressed in units, thus sales might be expressed as 20 times inventory. Thus, the ratio is a pure quantity or number, independent of the measurement units being used.

A financial ratio is defined as a *relationship between two variables taken from financial statements of a concern*. It is a mathematical yardstick which measures the relationship between two financial figures. It involves the breakdown of the examined financial report into component parts which are then evaluated in relation to each other and to exogenous standards.

As the ratio represents a relationship between figures, a number of ratios can be formed by taking any two figures from the financial statements. However, such an approach would not fulfill any purpose unless the figures chosen are significantly correlated with each other. Furthermore, many of the ratios tend to deal with different aspects of the same relationship, and there is little point in calculating several ratios in order to investigate the same point. Experts have identified some ratios as significant and important since they throw considerable light on the financial position of a concern.

Interpretation of Ratio

One of the most difficult problems confronting the analyst is the interpretation and analysis of financial ratios. An adequate financial analysis involves more than an understanding and interpretation of each of the individual ratios. Furthermore, the analyst requires an insight into the meaning of inter-relationships among the ratios and financial data in the statements. Gaining such an insight and understanding requires considerable experience in the analysis and interpretation of financial statements. Moreover, even experienced analyst cannot apply their skill equally well to analyse and interpret the financial statements of different organizations. The characteristics may differ from industry to industry and from firm to firm within the same industry. A ratio that is high for one firm at one time may be low for another firm or for the same firm at a different time. Therefore, the analyst must be familiar with the characteristics of the firm of which he is interpreting the final ratios.

The analyst must not undertake the interpretation and analysis of financial ratios in isolation from other information. The following factors must be considered while analysing the financial ratios:

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- General economic condition of the firm
- Risk acceptance
- Future expectations
- Future opportunities
- Accounting system of the industry
- Analysing and interpretation system used by other firms in the industry.

The analysis and interpretation of financial ratios in the light of the above-listed factors can be useful but the analyst must still rely on skill, insight, and even intention in order to interpret the ratios and arrive at a decision. The interpretation of the ratios can be made by comparing them with:

- Previous figures – trend analysis;
- Similar firms – inter-firm comparisons;
- Targets – individual ratio set to meet the objective.
- **Trend Analysis** The analyst usually use historical standards for evaluating the performance of the firm. The historical standards represent the financial ratios computed over a period of time which sets the trend. Trend analysis provides enough clues to the analyst for proper evaluation of the financial ratios. However, the changes in firm's policies over the period must be considered while interpreting ratios from comparison over time. Further, the average of the ratios for several years can also be used for this purpose.
- **Inter-firm Comparisons** Inter-firm comparisons may advocate the comparisons of similar ratios for a number of different firms in the same industry. Such an attempt would facilitate the comparative study of financial position and performance of the firms in the industry. The published ratios of trade associations or financial institutions can be of great help to the analyst in interpreting the financial ratios. However, the variations in accounting system and changes in the policies and procedures of the firm in comparison with the industry have to be taken care of while making use of inter-firm comparisons.
- **Targets** Under this method, the interpretation of the ratio is made by comparing it with the standard set for this purpose. Such a standard ratio, based upon well-proven conventions serves as a measuring scale for the evaluation of the ratios. The best example of such standard is the 1:1 ratio, which is to be considered as a good ratio for analysing the acid-test ratio.

Generally speaking, the use of single standard ratio for the interpretation of ratios is not much useful. The accounting experts usually recommend the use of groups of standard ratios for the evaluation of financial ratios.

Advantages of Ratio Analysis

Ratio analysis helps the management to identify specific areas that reflect improvement or deterioration, as well as detect the trouble spots that may prevent the attainment of objectives. The interested parties undertake frequent examination of different areas of business to evaluate the management's ability to maintain a satisfactory balance among them, and to appraise the efficiency and effectiveness with which the management directs the firm's operations. Thus, the purpose of ratio analysis is to help the reader of financial statements to understand the information shown by highlighting a number of key relationships. However, the following are the principal advantages claimed by ratio analysis:

- It guides management in formulating future financial planning and policies.
- It throws light on the efficiency of the business organization.
- It permits comparison of the firm's figures with data for similar firms, and possibly with industry-wise data. It also allows the data to be measured against yardsticks of performance or of sound financial condition.
- It ensures effective cost control.
- It provides greater clarity, perspective, or meaning to the data, and it brings out information not otherwise apparent.
- It measures profitability and solvency of a concern.
- It permits monetary figures of many digits to be condensed to two or three digits and therefore enhances managerial efficiency.
- It helps in investment decisions.

Limitations of Ratio Analysis

In using ratios, the analyst must keep a few general limitations in mind. The main limitations attached to it are:

- It lacks standard values for the ratio, therefore, scientific analysis is not possible.
- As there are no standards of comparison, it fails to throw light on the efficiency of any activity of the business.
- It gives only the relationship between different variables and the actual magnitudes are not known through ratios.
- Ratios are derived from financial statements and naturally reflect their drawbacks.
- It fails to indicate immediately where the mistake or error lies.
- It does not take into consideration the market and other changes.

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Check Your Progress

1. Mention the elements of comparisons in the interpretation of the ratios.
2. State the purpose of ratio analysis.

3.3 CLASSIFICATION OF RATIOS

Ratios have been classified by different experts differently based on their peculiar characteristics. Some authorities classify ratios on the basis of the financial statements or statements from which the financial figures are selected. Accordingly, the following classification of ratios can be formed:

- **Profit and Loss Ratios:** These ratios indicate the relationship between two such variables which have been taken from the profit and loss account. Basically, there are two types of such ratios, viz., those showing the current year's figures as a percentage of last year, thus facilitating comparison of the changes in the various profit and loss items; and those expressing relationship among different items of the current year, for example, the percentage of distribution expenses to sales.
- **Balance Sheet Ratios:** Top management will probably want to view the financial structure of the company in terms of basic ratios of asset or liability categories to total assets. This set of ratios attempts to express the relationship between two balance sheet items, e.g., the ratio of stock to debtors, or the ratio of owner's equity to total equity.
- **Inter-statement Ratios/Mixed Ratios:** The components for computation of these ratios are drawn from both balance sheet and profit and loss account. These ratios deal with the relationship between operating and balance sheet items. The examples of such ratios are debtors' turnover ratio, fixed assets turnover ratio, working capital turnover ratio, and stock turnover ratio.

  Some authorities classify the ratios on the basis of time to which the ratios computed belong. On this basis, the ratio can be divided into following two major groups:
- **Structural Ratios:** Structural ratios exhibit the relation between two such items which relate to the same financial period. Thus, the above-mentioned classification of ratios, i.e., profit and loss ratios, balance sheet ratios and mixed ratios are covered under structural ratios if the components for the computation of these ratios are drawn from the financial statement that relate to the same period.
- **Trend Ratios:** These ratios deal with the relationship between items over a period of time. Trend ratios indicate the behaviour of ratios for

the period under study and thus provide enough scope for the proper evaluation of the business.

Another classification of ratios as developed by financial experts is on the basis of significance of ratios. Some ratios are considered more important than others when ratios are evaluated in the light of the objectives of the business. Accordingly, the following two main groups of ratios are covered under this classification:

- **Primary Ratios:** Every commercial concern considers profit as its prime objective, and therefore, any ratio that relates to such objective is treated as a primary ratio. The ratios covered by this category are return on capital, gross margin to sales, etc.
- **Secondary Ratios:** Ratios other than primary ratios are known as secondary ratios. Such ratios are treated as supporting ratios to the primary ratios because these ratios attempt to explain the primary ratios. Ratios such as turnover ratios, expenses ratios, earnings per share are considered as secondary ratios.

Ratios are also classified according to the financial characteristics they describe. Accordingly, the following classification of ratios is made:

- Liquidity Ratios;
- Leverage Ratios;
- Profitability Ratios; and
- Activity Ratios.

The classification on the basis of characteristics is simple to calculate and easy to understand as compared to other classifications discussed above. Therefore, this classification is always preferred by the financial analyst to evaluate the business performance. Accordingly, a detailed discussion follows on the classification of ratios based on their financial characteristics.

3.3.1 Liquidity Ratios

The liquidity ratios indicate the liquidity of a company. They, in fact, measure the ability of a company to meets its current liabilities as they fall due. If the company has insufficient current assets in relation to its current liabilities, it might be unable to meet its commitments, and be forced into liquidation. Thus, ratios comparing the relationship between various groups of current assets and current liabilities are computed to measure the liquidity position of the company. Such ratios help in ascertaining the effectiveness of the working capital management. To gain an insight, analysts also use the variables other than those covered by the term working capital. The following are the important liquidity ratios:

- **Current Ratio:** This is a fundamental measure of a firm's financial position in the short run, namely, its ability to meet normal operating

obligations during one financial year. The current ratio compares the total current assets with the total current liabilities to find out whether the net assets are sufficient to meet the short-term obligation of the business. It is computed by dividing current assets by current liabilities. Current assets include cash, stock, work-in-progress, marketable securities and accounts receivable. On the other hand, current liabilities include accounts payable, sundry creditors, accrued income taxes, proposed dividend, borrowings from financial institutions and outstanding expenses. Usually current ratio is used by trade creditors to estimate the company's ability to repay its credit. The current ratio is calculated as:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

A high current ratio indicates a large proportion of current assets are available to meet current liabilities. Usually the higher the ratio, the better is a company's current financial position and normally the better it can meet current obligations. But at the same time, a higher current ratio would also mean that the company may have an excessive investment in current assets that does not produce a significant return. On the other hand, a low current ratio would indicate that sufficient cash is not available to pay current liabilities. A frequently used guideline to evaluate the adequacy of the current ratio is 2:1 or 2. However, there seems to be very little justification for such a standard. For some businesses, this may be an adequate current ratio, for others it may be too high or too low. Therefore, the standard for this ratio will vary from industries to industries. In fact, many renewed companies have much lower current ratio, as low as 1:1. In evaluating the appropriateness of current ratios, much depends on the nature of the business, composition of a firm's current assets, and turnover of the firm's certain current assets.

- **Acid-test Ratio:** It provides an even more critical look at the ability of the company to meet its day-to-day obligations. It signifies a very short-term liquidity of a business concern and is, therefore, also called 'liquid ratio'. If it is desired to apply a still stiffer and rigorous test for evaluating a firm's financial position in the short period, the application of acid-test ratio is recommended. The acid-test ratio is computed by dividing current assets in liquid form by current liabilities. Thus, stocks and similar items are excluded from current assets, leaving items such as debtors, bills receivable, marketable securities, and cash, which are already in liquid form, or may easily be converted into cash by discounting or factoring. The acid-test ratio assumes that stock may not be realized immediately and, therefore, this item is excluded in the computation of this ratio. Some experts advocate that the bank overdraft

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should also be excluded from current liabilities while calculating acid-test ratio. The logic for the exclusion of bank overdraft is based on the fact that bank overdraft is generally a permanent way of financing. The acid-test ratio is expressed as follows:

$$\text{Ratio} = \frac{\text{Current Assets (Stock)}}{\text{Current Liabilities}}$$

Too low a ratio suggests not only inability to meet current claims but also inability to take advantage of cash discounts and other rewards for prompt payment (such as lower interest rates on borrowings). Further, a company with a low quick ratio may be forced to obtain a short-term loan plus interest charges, or implement some other measures to obtain the required cash. On the other hand, an excessive amount of quick assets could indicate that these assets should be put to more productive or profitable use elsewhere in the enterprise. An acid-test ratio of 1:1 is usually considered ideal and satisfactory. However, this is a rule of thumb and should be applied with care. The advocacy of ratios depends on the industry in which the firm operates.

- **Receivables Turnover:** Another measure of liquidity is receivable turnover, which indicates the number of times that the average outstanding net receivables is turned over or converted into cash through collections during each year. Receivables turnover is the amount of period required for one complete cycle: From the time receivables are recorded through collection to the time new receivables are recorded. The faster the cycle is completed, the more quickly receivables are converted into cash. When the customers' accounts are collected promptly with little loss or collection expense, the firm finds it easier to meet its obligations when they become due. On the other hand, a long credit period granted to creditors would adversely affect the firms' liquidity position. The receivables turnover is the ratio of sales to net accounts receivable. This ratio is expressed as under:

$$\text{Receivable Turnover} = \frac{\text{Net Sales}}{\text{Average Receivables *}}$$

Some experts believe that the use of beginning and ending balances of receivables to calculate averages fail to give accurate results because year-end balances may not represent account balances most of the time during the year due to seasonal variation in business volume. Therefore, it is advisable to use current year's monthly or quarterly data instead of beginning and ending balances for calculating average receivables.

* Receivables include both debtors and bills receivable and average receivables is calculated as:

$$\text{Average Receivables} = \frac{\text{Receivables at the beginning} + \text{Receivables at the end}}{2}$$

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It is important to note that while calculating receivables turnover, only credit sales should be used. However, this information often is not available in the financial statements, and therefore, the net sales is used for the purpose.

Sometimes the receivable turnover is expressed as the 'collection period', viz., how many days (on the average) it takes to collect each rupee due. For the period in question (week, month, quarter, year, etc.), the collection period is calculated as:

$$\text{Day's sales in Receivable} = \frac{\text{Average Receivable}}{\text{Avarage Daily Sales* (credit)}}$$

A high ratio of receivables to sales suggests over-exposure to credit losses and excessive costs in terms of interest on the capital required to extend credit to customers. Whereas a low ratio suggests insufficient extension of credit and therefore, lost sales and lost profits.

- **Inventory Turnover:** The liquidity of inventories is measured by the number of times per year that inventory is converted into cost of goods sold. Hence, it is a device to measure the efficiency of the inventory management. However, in its zeal to show a high ratio, inventories are not allowed to drop down below the danger level. This ratio is worked out as under:

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

Sometimes it is considered more helpful to express the relationship between inventory and cost of goods sold as the 'number of days' supply of inventory'; in other words, the number of days the inventory supply could last. For the period in question, the number of days' supply of inventory is calculated as:

$$\text{Day's supply of Inventory} = \frac{\text{Average Inventory}}{\text{Average day's cost of goods sold**}}$$

The average day's supply of inventory can also be computed with the help of the following formula:

$$\text{Day's supply of Inventory} = \frac{\text{Number of days in period}}{\text{Inventory Turnover (Ratio)}}$$

$$* \text{ Average daily sales} = \frac{\text{Total credit sales}}{\text{360 (or 365 days)}}$$

The collection period can also be calculated with the help of the following formula:

$$\text{Days' sales in receivable} = \frac{\text{360 (or 365 days)}}{\text{Receivable turnover (ratio)}}$$

Note: We use 360 (or 365) days representing a year in the calculation of average daily sales. Such days can be more or less in a financial year depending on number of Sundays and holidays which have to be excluded.

$$** \text{Average day's cost of goods sold} = \frac{\text{Cost of goods sold}}{\text{Number of days in period}}$$

Inventory turnover rates vary tremendously by the nature of the business. It is usually desirable to compare a firm's inventory turnover with the turnover experience by comparable companies. It is not unusual for retailers of perishable commodities to experience a higher inventory turnover than those retailers who deal in durable goods. At the other extreme, retailers of jewellery frequently reflect a low yearly inventory turnover. A high turnover compensates for a lower margin on each item, producing a normal profit for the business. On the other hand, a business that sells slow-moving goods must make up for the low turnover by a higher profit margin on each item sold. Of great importance, however, is the need to evaluate the trend in the firm under review. Whether the trend is desirable would require detailed investigation into such aspects as changes in manufacturing techniques, labour slow downs, or inventory stockpiling in anticipation of price increases.

Illustration 3.1: From the following Balance Sheet of Lily Ltd., you are required to calculate the liquidity ratios and give your comments:

Lily Ltd.

Balance Sheet

(*as on 31st Dec., 2012*)

Liabilities	₹	Assets	₹
Share Capital:			
60,000 shares @ ₹10 each	6,00,000	Machinery	2,40,000
6% Debentures	2,50,000	Building	2,50,000
Reserves	1,10,000	Furniture and fittings	1,10,000
Bills payable	60,000	Investment (share in XY Co. Ltd.)	1,00,000
Trade creditors	40,000	Inventories	1,20,000
Income tax payable	25,000	Bills receivable	45,000
Outstanding expenses	40,000	Trade debtors	60,000
Bank overdraft	30,000	Short-term investment	65,000
		Cash at bank	1,10,000
		Cash in hand	55,000
	11,55,000		11,55,000

Solution

1. $\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$

$$= \frac{1,20,000 + 45,000 + 60,000 + 65,000 + 1,10,000 + 55,000}{60,000 + 40,000 + 25,000 + 40,000 + 30,000}$$

$$= \frac{4,55,000}{1,95,000} = 2.33:1$$

2. $\text{Quick Ratio/Acid-Test Ratio} = \frac{\text{Current Assets} - \text{Stock}}{\text{Current Liabilities}} = \frac{4,55,000 - 1,20,000}{1,95,000}$

$$= \frac{3,35,000}{1,95,000} = 1.72:1$$

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Using the traditional guidelines, one would conclude that Lily Ltd. has adequate liquidity. The value of the current ratio indicates that the company has current assets of ₹ 2.33 to pay a current liability of ₹ 1. At the same time, acid-test ratio of the company indicates that for every current liability of ₹ 1 the company has the quick assets of ₹ 1.72. Depending upon the circumstances, this may be enough to assure the liquidity of the company.

Illustration 3.2: M/s Sunlight Ltd. submits the following information for the year ending 31st December 2012:

Sales during the year		
Cash	3,00,000	
Credit	1,60,000	₹ 4,60,000
Stock:		
Opening		₹ 40,000
Closing		₹ 60,000
Gross profit for the year		₹ 1,60,000
Trade debtors:		
1-1-2012		₹ 10,000
31-12-2012		₹ 14,000
Bills receivable:		
1-1-2012		₹ 9,000
31-12-2012		₹ 7,000

You are required to calculate Inventory Turnover and Receivable Turnover ratio from the above given information.

Solution

1. Inventory Turnover Ratio $= \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}} = \frac{₹\,3,00,000}{₹\,50,000}$

   = 6 times

2. Receivable Turnover Ratio $= \frac{\text{Net Sales (Credit)}}{\text{Average Receivable}} = \frac{₹\,1,60,000}{₹\,20,000}$

   = 8 times

Workings:

1. Cost of goods sold = Sales – Gross Profit

   = ₹ 4,60,000 – ₹ 1,60,000

   = ₹ 3,00,000

2. Average Inventory $= \frac{₹\,40,000 + 60,000}{2}$

   = ₹ 50,000

3. Average Receivable* $= \frac{₹\,19,000 + 21,000}{2}$

   $= \frac{₹\,40,000}{1}$

   = ₹ 20,000

*Receivables include both receivable as well as trade debtors.

3.3.2 Leverage or Solvency Ratios

Leverage is a reflection of the use of borrowed funds by a company to increase the return on owner's equity. Leverage ratios measure the contribution of financing by owners compared with financing provided by the firm's creditors. As the liquidity test measures the ability of a firm to meet its current financial obligations, leverage ratios, which gauge a firm's solvency, attempt to monitor the ability of a firm to pay all of its debts—current as well as non-current, as they become due. The capital structure of almost every company consists of two major components, viz.,

- Equity capital—capital that belongs to owners-investors
- Debt capital—amount that belongs to creditors

The proportion of debt capital to the total capital of a firm is usually referred to as '*leverage'* or *trading on the equity*. The fundamental economic principle underlying leverage is that whenever funds are borrowed at a lower rate of interest than the borrower can earn on those funds, the rate of return of owner's equity is increased over what it otherwise would have been had the borrowed funds been provided by the owners (Hobbs and Moore[1], 1979). Borrowing too heavily, however, can invite financial difficulty primarily because interest payments and principal repayments are contractual obligations that must be honoured. The ability to obtain and to repay a long-term debt often depends on a firm's ability to obtain capital from shareholders. Therefore, the relationship between shareholders' equity and creditors' equity is evaluated. The leverage ratios commonly used are discussed below.

- **Debt–Equity Ratio:** It develops the relationship between owned funds and the borrowed funds. This reflects the extent to which borrowed capital is used in place of equity capital. Business firms acquire assets both with owners' and creditors' funds. The larger the portion of funds provided by owners, the less risk is assumed by creditors. The debt-equity ratio is worked out as:

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Owners' Equity}}$$

The ratio represents the proportion of external equity to internal equity in the capital structure of the firm. The external equity* represents the amount of debts/liabilities to outsiders. It includes both short-term as well as long-term liabilities. On the other hand, owners equity** includes all such liabilities that belong to the shareholders, e.g., share capital (both preferential as well as equity), reserves and surpluses. However, the

*Some financial analysts are of the opinion that external equity (debt) includes only long-term debt instead of total debt comprising both short-term as well as long-term debts.

** Few experts on the subject prefer to consider only equity shareholders in the calculation of owners' equity and exclude preferential shareholders in the calculation. The plea to exclude preferential shareholders in the calculation of owners' equity is based on the fact that such shares are entitled to a fixed rate of dividend and therefore they fall within the scope of fixed interest bearing securities.

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accumulated losses and deferred expenses are to be deducted from the owner's equity in the calculation of debt–equity ratio.

Either too high or too low a ratio may be disadvantageous. Too high suggests that management is not taking advantages of opportunities to maximize profits through borrowing. Too low suggests undue exposure to risks of bankruptcy and to a fixed burden of interest expenses in the event of a period of relatively low profit (when the rate of return on total capital is less than the interest rate on borrowed capital). As a rule of thumb, debt–equity ratio of less than 2:1 is taken as acceptable, but this is not based on any scientific analysis. However, many financial analysts prefer to consider 1:1 as safe. As the ratio increases, the amount of risk assumed by creditors increases, because the ratio indicates decreasing solvency. In fact, the acceptable level of ratio will vary from firm to firm. For example, banking institutions will have much higher debt–equity ratio as compared to manufacturing or trading concerns.

- **Equity Ratio/Proprietary Ratio:** A variant to the debt–equity ratio is the proprietary ratio which indicates the relationship between owner's equity and total assets. It measures the proportion of a company's assets that are provided or claimed by the owners. The ratio of owners' equity to total assets is a measure of the financial strength or weakness of the enterprise. Recall that the owners' equity is the residual interest in a firm's assets after allowance has been made for the claims of creditors against the assets. If the owners' equity is a small proportion of the total assets, the enterprise may be considered financially weak, because the owners have a relatively small investment in the firm as compared to the creditors. On the other hand, a low proprietary ratio would indicate a relatively larger degree of security for the company. This ratio is worked out as follows:

$$\text{Equity Ratio} = \frac{\text{Owners' Equity}}{\text{Total Assets}}$$

The components of the proprietary ratio are owners' equity and total assets. The owners' equity includes share capital both preferential and equity, undistributed profits, reserves and surplus. The amount of owners' equity must be deducted by the amount of accumulated loss, if any. On the other hand, the total assets represent the total resources of the company. However, some experts are of the opinion that the total assets of a company for the purpose of proprietary ratio should include only tangible assets. Consequently, the amount of goodwill shall be excluded from the total assets in the computation of owners' equity to total assets.

- **Ratio of External Equities to Total Assets (Solvency Ratio):** This is a variant of the proprietary ratio. This ratio measures the proportion

of a firm's assets that are financed by creditors. To the creditor, a low ratio would ensure greater security for extending credit to the firm. However, a too low ratio suggests that management is not using its credit most advantageously. This ratio is expressed as under:

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$$\text{Solvency Ratio} = \frac{\text{External Equity}}{\text{Total Assests}}$$

The term external equities represent all debts, both long-term as well as short-term. On the other hand, total assets refer to total resources of the concern.

- **Fixed Assets to Net Worth Ratio (Ratio of Fixed Assets to Proprietor's Funds):**This ratio indicates the percentage contributed by owners to the value of fixed assets. It can be worked out as follows:

$$\text{Fixed Assests to Net Worth} = \frac{\text{Fixed Assets}}{\text{Net Worth}}$$

Fixed assets represent cost of acquisition of the fixed assets deducted by the amount of depreciation thereon up to the period. The net worth represents the amount due to the shareholders, i.e., share capital, reserves and surpluses. Financial experts are of the opinion that in manufacturing concerns, investment in plants should be made out of equity rather than borrowed capital, therefore, a ratio of at least 1:1 is considered desirable. On the other hand, a lower ratio suggests an undue burden of debt on the enterprise that tends to increase the internal rate at which an enterprise can borrow.

- **Current Assets to Net Worth Ratio:** This ratio signifies the relationship between the current assets and net worth. In other words, it is a correlation between current assets and net worth. We can put this as under:

$$\text{Current Assets to Net Worth Ratio} = \frac{\text{Current Assets}}{\text{Net Worth}}$$

This ratio indicates the extent to which shareholders' funds have gone into the financing of the current assets. It is advisable to study the ratio of current assets to net worth with the ratio of fixed assets to net worth.

- **Interest Coverage Ratio** A company is considered solvent if its revenue is more than its interest and other expenses. Consequently, the company that has revenue sufficient to meet only the expenses and leaving nothing as net income is considered less solvent. Against this background, one of the approaches to test solvency of the enterprise is interest coverage ratio. This ratio measures how many times a company could pay its interest expenses. This ratio is calculated by dividing interest expenses into earnings available for payment of interest expense. We can put this as under:

$$\text{Interest Coverage Ratio} = \frac{\text{Net Profit before Interest and Tax}}{\text{Fixed Interest Charges}}$$

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Interest coverage ratio measures the ability of a firm to protect the interests of long-term creditors. It is often stated that in order to ensure adequate protection to long-term creditors, this ratio should be 2 or more.

Illustration 3.3: From the following balance sheet you are required to calculate leverage ratios:

Balance Sheet

Liabilities	₹	Assets	(₹)
3,000 Equity shares @ ₹ 100	3,00,000	Building	2,50,000
each	1,50,000	Furniture	40,000
7% Debentures	80,000	Machinery	2,10,000
Reserves and Surplus	30,000	Stock	60,000
Sundry creditors	50,000	Debtors	30,000
Bills payable		Cash balances	20,000
	6,10,000		6,10,000

Solution

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Owner's Equity}} = \frac{₹\ 2,30,000}{₹\ 3,80,000}$$

$$= 0.61 \text{ (approx.)}$$

$$\text{Equity Ratio} = \frac{\text{Owner's Equity}}{\text{Total Assets}} = \frac{₹\ 3,80,000}{₹\ 6,10,000}$$

$$= 0.62 \text{ (approx.)}$$

$$\text{External Equitites to Total Assets Ratio} = \frac{\text{External Equity}}{\text{Total Assets}}$$

$$= \frac{₹\ 2,30,000}{₹\ 6,10,000}$$

$$= 0.38 \text{ (approx.)}$$

$$\text{Fixed Assets to Net Worth Ratio} = \frac{\text{Fixed Assets}}{\text{Net Worth}}$$

$$= \frac{₹\ 5,00,000}{₹\ 3,80,000} = 1.32 \text{ (approx.)}$$

$$\text{Current Assets to Net Worth Ratio} = \frac{\text{Current Assets}}{\text{Net Worth}}$$

$$= \frac{₹\ 1,10,000}{₹\ 3,80,000}$$

$$= 0.29 \text{ (approx.)}$$

3.3.3 Profitability Ratios

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Profit has always been considered as the main indicator of a successful business. However, the real test of success or failure of a business is to evaluate its profit-earning capacity in relation to capital employed. It is against this background that financial experts developed profitability ratios which are used to measure the ability of the firm to convert sales into profits and to earn profits on assets employed. These indicate degree of success in achieving profit levels. The following are important profitability ratios:

- **Gross Profit Margin Ratio:** This ratio indicates the relationship between gross profit and sales. It reflects how well cost of goods sold, a major expense item, is being controlled. It shows the profit made on sales before taking account of overheads. Thus, the gross profit margin highlights the production efficiency of a concern. It is always preferred to express this ratio in terms of percentage. The gross profit margin is computed by deducting cost of goods sold from the amount of sales as shown below:

$$\text{Gross Profit Margin Ratio} = \frac{\text{Sales} - \text{Cost of Goods Sold}}{\text{Sales}} \times 100$$

$$= \frac{\text{Gross Operating Profit}}{\text{Sales}} \times 100$$

  In interpreting the gross profit margin ratio, it is important to observe any trend, but in making comparisons between companies it is vital to appreciate that gross profit margins vary considerably from industry to industry. However, gross profit margin must be sufficient to meet administrative and distribution expenses, dividend and accumulation of reserves.

- **Net Profit Margin Ratio:** It monitors the net profit made in relation to sales. This ratio, also known as net operating margin, is calculated by dividing the net profit after tax by the amount of sales. Thus, net profit margins ratio can be written as under:

$$\text{Net Profit Margin Ratio} = \frac{\text{Net Profit after Tax}}{\text{Sales}}$$

  In interpreting the net profit margin ratio it is important to bear in mind that such ratios vary considerably from firm to firm. Firms engaged in retailing are likely to have quite rapid turnover and to operate on low margins allied to high volume, while those firms engaged in selling a few large items must make a high profit in relation to the sales value of each one.

  The net profit margin ratio provides a relatively clear picture of how efficiently the firm maintains control over its total expenses. In addition, the analyst may wish to calculate the relationship between each expense

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item and sales to determine the extent to which specific expenses are under control or are tending to move out of control. For this purpose, expenses ratios are used. Expenses ratios monitor the various expenses incurred in relation to sales. A high expense ratio would indicate low profitability while a low ratio is an indication for higher profitability. This ratio can be worked out as under:

$$\text{Particular Expenses Ratio} = \frac{\text{Particular Expenses}}{\text{Sales}} \times 100$$

- **Return on Assets/Capital Employed:** One of the most widely used ratios is the return on assets.

  Since assets are used to generate income, the higher the income, the more productive assets were during the period. In computing the return on assets, the analyst must bear in mind that both borrowed as well as owned funds are used by the business for the acquisition of assets, therefore, the return on assets should be computed before accounting for the interest on borrowed capital. At the same time, income tax too is not considered while calculating this ratio because taxes are calculated on income after interest deductions. Consequently, earning (income) before interest and taxes is usually used to measure the return on assets. Thus,

$$\text{Return on Assets} = \frac{\text{Earnings before Interest and Taxes (EBIT)}}{\text{Average Assets *}} \times 100$$

  When details about interest and tax are not available from financial statements, the analyst may replace earnings before interest and tax by net income in the calculation of the return on total assets.

- **Return on Owners' Equity:** Though the ratio of net profit to sales is a very useful indicator of performance in comparison to the company's experience in prior periods or to the current experience of other companies, it does not give a direct answer to a vital question: is the business providing an adequate return on the owners' investment, taking into account the risk associated with the company's business and what could be the earnings of this investment in alternative ventures? To help answer this question, the ratio of return on owners' equity is needed. The profit earned by the owners of a business is called return on owners' equity. This ratio is considered as an effective indicator of a company's profitability because it reflects the management's success in efficient utilization of the owners' investment. The return on owners' equity is worked out with the help of the following formula:

$$\text{Return on Owners' Equity} = \frac{\text{Net Profit after Taxes}}{\text{Owner's Equity}} \times 100$$

*In the computation of average assets, the fictitious assets must be excluded

- **Return on Equity Capital:** Equity shareholders are more serious as compared to preference shareholders in the profitability of a company. It is perhaps so because equity shareholders assume the highest risk in the company. Preference shareholders are assured of the rate of dividend, and therefore, the profitability of the company has no meaning for them. On the other hand, the rate of dividend for equity shareholders largely depends on the availability of profits. With the result, return on equity capital is a useful indicator for equity shareholders to measure the performance of the company. Return on equity capital monitors the profit made by the company in relation to its equity capital. This ratio is worked out as under:

$$\text{Return on Equity Capital} = \frac{\text{Net Profits after Tax} - \text{Preference Dividend}}{\text{Equity Share Capital}} \times 100$$

- **Earnings Per Share (EPS):** This is a well known and widely used indicator of profitability because it can easily be compared to the previous EPS figure and to the EPS figure of other companies. The earnings per share represent average amount of net income earned by single equity share. This is calculated with the help of the following formula:

$$\text{EPS} = \frac{\text{Net Profit after Tax} - \text{Preference Dividend}}{\text{Number of Equity Shares}}$$

Illustration 3.4: The following are the summarised profit and loss account of Sweety Ltd. for the year ended 31st March, 2011:

Profit and Loss Account

Particulars	₹	Particulars	₹
To Opening stock	2,20,000	By Sales	9,00,000
To Purchases	6,00,000	By Closing stock	3,00,000
To Wages	1,60,000		
To Gross profit c/d	2,20,000		
	12,00,000		12,00,000

Particulars	₹	Particulars	₹
To Administrative expenses	40,000	By Gross profit b/d	2,20,000
To Selling and distribution	45,000	By Interest (from investment	
expenses	40,000	outside	40,000
To Non-operating expenses	1,75,000	business)	40,000
To Net profit	3,00,000	By Profit on sale of investment	3,00,000

Assume the rate of tax as 40 per cent

You are required to calculate:

(i) Gross Profit Margin Ratio

(ii) Net Profit Margin Ratio

(iii) Selling and Distribution Expenses Ratio.

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Solution

$$\text{Gross Profit Margin Ratio} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

$$= \frac{₹\ 2,20,000}{₹\ 9,00,000} \times 100 = 24.4\%$$

$$\text{Net Profit Margin Ratio} = \frac{\text{Net Profit after Tax}}{\text{Sales}} \times 100$$

$$= \frac{1,05,000}{9,00,000} \times 100$$

= 11.66%

$$\text{Selling and Distribution Expenses} = \frac{\text{Selling and Distribution Expenses}}{\text{Sales}} \times 100$$

$$= \frac{45,000}{9,00,000} \times 100$$

= 5 per cent

Working Notes:

Calculation of profits after tax:

	₹
Profit as per P&L A/c	1,75,000
Less: Tax @ 40%	70,000
Profit after tax	1,05,000

Illustration 3.5: On the basis of information given in Illustration 9.4 and the information given below, you are required to calculate the following ratios:

(i) Return on Assets
(ii) Return on Equity Capital
(iii) Return on Owner's Equity
(iv) Earnings Per Share.

Additional Information:

Capital:

5,000, 7% preference shares @ 100 each fully paid: 15,000 equity shares @ 100 each fully paid Assets:

1 - 4 - 2010	₹ 5,50,000
31 - 3 - 2011	₹ 7,00,000

Solution:

$$\text{Return on Assets} = \frac{\text{Earnings before Interest and Taxes (EBIT)}}{\text{Average Assets}} \times 100$$

$$= \frac{₹\ 1,75,000}{₹\ 6,25,000} \times 100$$

= 28 per cent

$$\text{Return on Owners Equity} = \frac{\text{Net Profit after Tax}}{\text{Owners' Equity}} \times 100$$

$$= \frac{₹\ 1,05,000}{₹\ 20,00,000} \times 100$$

= 5.25 per cent

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$$\text{Return on Equity Capital} = \frac{\text{Net Profit after Tax} - \text{Pref. Dividends}}{\text{Equity Share Capital}} \times 100$$

$$= \frac{₹\ 1,05,000 - ₹\ 35,000}{₹\ 15,00,000} \times 100$$

= 4.67 per cent

$$\text{Earnings per Share} = \frac{\text{Net Profits after Tax} - \text{Pref. Dividends}}{\text{No. of Equity Shares}}$$

$$= \frac{₹\ 1,05,000 - ₹\ 35,000}{15,000}$$

$$= \frac{₹\ 70,000}{15,000} = ₹\ 4.67$$

Working Notes:

Calculation of Preferential Dividend:

= 7/100 × 5,00,000 = ₹ 35,000

Calculation of Average Assets:

$$\frac{\text{Operating Balance} + \text{Closing Balance}}{2}$$

$$= \frac{₹\ 5,50,000 + ₹\ 7,00,000}{2}$$

= ₹ 6,25,000

3.3.4 Dupont Chart

Profit analysis is the most important application of profitability ratios. Internal management would like to understand where extra efforts are needed to improve profitability and where the company has done well. There are mainly three functions of business, namely, (a) operations, (b) investment and (c) financing. Profits can be earned or lost from any of these functions. Operations functions involve day-to-day decisions whereas investing and financing decisions have long-term implications. These three functions must be tied together to identify areas where profit is earned or lost. The Du-Pont Company developed a method for tying these three to explain the incidence of profit earning.

Du-Pont Company developed the method of analysing profit-making activities that can be understood from the relevant ratios. The simple Du-Pont chart ties three ratios namely, (a) net margin ratio, (b) net asset turnover ratio and (c) capital structure ratio.

$$\text{ROE} \quad \frac{\text{(Net Profit)}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Net Assets}} \times \frac{\text{Net Assets}}{\text{Equity}}$$

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Illustration 3.6: Conduct a simple Dupont analysis for the XYZ company from the following income statement and balance sheet for the years 2013 and 2014.

Income Statement and Balance Sheet

XYZ Company Income Statement for period ended on 31st March...	2013	2014
Sales Revenue	1,900.0	2,000.0
Variable Costs	1,300.0	1,325.0
Contribution (Gross Margin)	600.0	675.0
Fixed Costs (General Selling & Administrative Expenses)	435.0	425.0
Operating Income (EBIT)	165.0	250.0
Interest Expense	34.0	34.0
Taxable Income (PBT)	131.0	216.0
Income Tax	44.5	73.4
Net Profit After Tax (PAT)	86.5	142.6
Allocation of Net Income:		
Dividends	51.6	51.6
Change in Retained Earnings	34.9	91.0

XYZ Company Balance Sheet as on 31st March...	2013	2014
Assets		
Net Property Plant & Equipment (after depreciation)	1,200.0	1,250.0
Current Assets		
Inventories	300.0	350.0
Receivables	450.0	600.0
Cash and Marketable Securities	250.0	241.0
Total Current Assets	**1,000.0**	**1,191.0**
Current Liabilities		
Accounts Payable	380.0	450.0
Short-term Debt	120.0	200.0
Total Current Liabilities	**500.0**	**650.0**
Net Working Capital	**500.0**	**541.0**
Net Asset	**1,700.0**	**1,791.0**
Shareholders' Equity	1,275.0	1,366.0
Long-term Debt/Liabilities	425.0	425.0
Long-term Debt + Equity	**1,700.0**	**1,791.0**

Solution: For the XYZ Company, the simple Du-Pont analysis will be as follows:

$$\text{ROE (2013)} = \frac{86.50}{1900} \times \frac{1900}{1700} \times \frac{1700}{1275} - 4.55\% \times 1.12 \times 1.33 = 6.78$$

$$\text{ROE (2014)} = \frac{142.60}{2000} \times \frac{2000}{1791} \times \frac{1791}{1366} - 7.13\% \times 1.12 \times 1.33 = 10.46\%$$

3.3.5 Activity or Turnover Ratios

Activity ratios measure the efficiency of a firm in utilizing the available resources. Such ratios reflect the success of a firm in utilizing its resources in business activities. Activity ratios are popularly known as *turnover ratios* because they highlight the ability of management to convert or turnover the

assets of the firm into sales. These ratios make a comparative study of the level of sales and the investment in various assets accounts. A sharp rise in this ratio may indicate that the company is expanding too quickly and is allowing sales to increase more rapidly than the underlying asset-base, a situation often referred to as 'over trading'. Conversely, a reduction in the ratio can indicate a decline in efficiency or a fall in demand for a firm's products. The important activity ratios are mentioned below:

- Fixed assets turnover
- Total assets turnover
- Inventory turnover
- Average collection period

The last two ratios of the above-mentioned activity ratios have already been discussed under liquidity ratio in the earlier section of this chapter.

- **Fixed Assets Turnover:** The ratio measures the efficiency in the utilization of fixed assets. The ratio of sales to fixed assets measures the turnover of the plant and machinery and is expressed as under:

$$\text{Fixed Assets Turnover} = \frac{\text{Sales}}{\text{Net Fixed Assets}}$$

- **Total Assets Turnover:** This ratio measures the overall performance and activity of the business organization. It is computed by dividing sales by total assets. The following formula is applied to compute this ratio:

$$\text{Total Assets Turnover} = \frac{\text{Sales}}{\text{Total Assets}}$$

Illustration 3.7: Compute the Fixed Assets Turnover and Total Assets Turnover from the following particulars:

Sales		₹ 3,00,000
Sales Return		₹ 40,000
Assets:		
Fixed	2,00,000	
Curent	1,50,000	₹ 3,50,000

Solution:

$$\text{Fixed Assets Turnover} = \frac{\text{Sales}}{\text{Fixed Assets}}$$

$$= \frac{₹\ 2,60,000}{₹\ 2,00,000}$$

$$= 1.3:1$$

$$\text{Total Assets Turnover} = \frac{\text{Sales}}{\text{Total Assets}}$$

$$= \frac{₹\ 2,60,000}{₹\ 3,50,000}$$

= 0.74:1

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Illustration 3.8: From the information given below calculate Inventory Turnover and Receivable Turnover.

Sales (100% credit):	₹4 ,50,000
Inventories:	
1-1-2012	₹ 60,000
31-12-2012	₹ 70,000
Return inwards:	₹ 30,000
Sundry debtors:	
1-1-2012	₹ 60,000
31-12-2012	₹ 40,000
Bills receivable:	
1-1-2012	₹ 30,000
31-12-2012	₹ 50,000
Gross profit	30 per cent

Solution

1. $$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$
$$= \frac{₹\ 2,94,000}{₹\ 65,000} = 4.52 \text{ times}$$

2. $$\text{Recoverable Turnover Ratio} = \frac{\text{Net Sales (credit)}}{\text{Average Receivable}}$$
$$= \frac{₹\ 4,20,000}{₹\ 90,000} = 4.67 \text{ times}$$

Working Notes:

1. Cost of goods sold = Net sales – Gross profit
= ₹ 4,20,000* – ₹ 1,26,000**
= ₹ 2,94,000

2. $$\text{Average stock} = \frac{\text{Opening stock} + \text{Closing stock}}{2}$$
$$= \frac{₹\ 60,000 + 70,000}{2}$$
$$= \frac{₹\ 1,30,000}{2}$$
= ₹ 65,000.

*Net Sales = Sales – Returns
= ₹ 4,50,000 – ₹ 30,000
= ₹ 4,20,000

** Gross profit
(30% of sales) = $\frac{30}{100} \times 4,20,000$
= ₹ 1,26,000

3. Average receivables $= \frac{\text{Opening balance} + \text{Closing balance}}{2}$

$= \frac{₹\,90{,}000 + ₹\,90{,}000}{2}$

$= \frac{₹\,1{,}80{,}000}{2}$

$= ₹\,90{,}000$

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3.4 CONSTRUCTION OF BALANCE SHEET

Since ratio analysis is used for the assessment of the items of the financial statements, the same ratios can be used as the foundation to retrace and prepare the balance sheet of the firms. In this section, you will learn about the construction of balance sheet from ratios through the help of illustrations.

Illustration 3.9: Following information is given to you:

	₹
1. Current liabilities	1,00,000
2. Reserves and surplus	50,000
3. Bills payable	40,000
4. Debtors	35,000
5. Current ratio	1.75
6. Acid-test ratio	1.15
7. Fixed assets to proprietor's funds	.75

The current assets of the firm consist of debtors, stock and cash. The firm does not have any long-term liability. You are required to prepare a balance sheet.

Solution

Balance Sheet

Liabilities	₹	Assets	₹
Capital	2,50,000	Fixed assets	2,25,000
Reserves and surplus	50,000	Stock	60,000
Bills payable	40,000	Debtors	35,000
Sundry creditors	60,000	Cash	80,000
	4,00,000		4,00,000

Working Notes:

I. Calculation of Current Assets:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$1.75 = \frac{\text{Current Assets}}{₹\,1{,}00{,}000}$$

$$\text{Current Assets} = ₹\,1{,}00{,}000 \times 1.75$$

$$= ₹\,1{,}75{,}000$$

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II. Calculation Stock:

Stock = Current Assets – Liquidity Asset*

= ₹ 1,75,000 – ₹ 1,15,000

= ₹ 60,000

III. Calculation of Cash Balances:

Cash = Liquid Assets – Debtors

= ₹ 1,15,000 – ₹ 35,000

= ₹ 80,000

IV. Calculation of Fixed Assets:

Since the firm does not have any long-term liability therefore, shareholder's equity should be equal to total net assets. If the fixed assets are 0.75 to proprietor's funds, net current assets should be 0.25 of the total net assets. Thus, fixed assets shall be:

$$\frac{0.75}{0.25} \times \text{Net Current Assets} = \frac{0.75}{0.25} \times 75{,}000^{**} = ₹\ 2{,}25{,}000$$

V. Calculation of Shareholder's Funds:

If fixed assets are 0.75, shareholder's funds should be 1.00. Therefore, when fixed assets are equal to₹ 2,25,00 then shareholder's funds will be :

$$\frac{100}{75} \times 2{,}25{,}000 = ₹\ 3{,}00{,}000$$

VI. Calculation of Share Capital:

Shareholders funds	=	3,00,000
Less: Reserves and Surplus	=	50,000
Share Capital	=	2,50,000

VII. Calculation of Sundry Creditors:

		₹
Current Liabilities	=	1,00,000
Less: Bills Payable	=	40,000
Sundry Creditors	=	60,000

$$\text{* Acid-test Ratio} = \frac{\text{Liquid Assets}}{\text{Current Liabilities}}$$

$$\therefore \quad 1.15 = \frac{\text{Liquid Assets}}{₹\ 1{,}00{,}000}$$

Liquid Assets = ₹ 1,00,000 × 1.15 = ₹ 1,15,000

** Net Current Assets = Current Assets – Current Liabilities

= ₹ 1,75,000 – ₹ 1,00,000 – ₹ 75,000

Illustration 3.10: From the below given particulars, prepare the Balance Sheet of Electro Ltd. on 31st March 2011.

	₹
Annual sales	1,40,000
Sales to net worth	4 times
Current liabilities to net worth	50%
Total debt to net worth	80%
Current ratio	2.2 times
Sales to inventory	8 times
Average collection period	40 days
Fixed assets to net worth	70%

NOTES

Assume that all sales are made on credit.

Solution

Balance Sheet of Electro Limited

Liabilities	₹	Assets	₹
Net worth	16,00,000	Fixed assets	11,20,000
Long-term debt	4,80,000	Stock	50,000
Current debt	8,00,000	Debtors	44,444
		Cash	16,65,556
	28,80,000		28,80,000

Working Notes:

1. Net Worth:

   Sales to net worth = 4 times

   ₹ 4,00,000 × 4 = ₹ 16,00,000

2. Current Liability:

   Current Liability to net worth 50%

   ₹ 16,00,000 × 50/100 = ₹ 8,00,000

3. Total Liability:

   Total debt to net worth 80%

   ₹ 16,00,000 × 80/100 = ₹ 12,80,000

4. Long-term Liabilities:

   = Total Liabilities – Current Liabilities

   = ₹ 12,80,000 – ₹ 8,00,000

   = ₹ 4,80,000

5. Current Assets:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

$$2.2 = \frac{\text{Current Assests}}{₹\ 8,00,000}$$

NOTES

Current Assets = ₹ 8,00,000 × 2.2

= ₹ 17,60,000

6. Inventory:

Sales to Inventory = 8 times

$$= \frac{40,000}{8} = ₹\ 50,000$$

7. Debtors:

Average collection period = 40 days

$$= \frac{4,00,000 \times 40}{360}$$

= ₹ 44.444

8. Cash: ₹

Current assets 17,60,000

Less: Stock ₹ 50,000

Debtors ₹ 44,444 94,444

16,65,556

9. Fixed Assets:

Fixed assets to net worth 70%

$$= \frac{₹\ 16,00,000 \times 70}{100} = ₹\ 11,20,000$$

Illustration 3.11: From the following information you are required to prepare a balance sheet:

1.	Current ratio	1.75
2.	Liquid ratio 1.25	
3.	Stock turnover ratio (Cost of sales/Closing stock)	9
4.	Gross profit ratio	25 per cent
5.	Debt collection period	1½ months
6.	Reserves and surplus to capital	0.2
7.	Turnover to fixed assets	1.2
8.	Capital gearing ratio	0.6
9.	Fixed assets to net worth	1.25
10.	Sales for the year	₹ 12,00,000

(*M.Com., Madras*)

Solution:

NOTES

Balance Sheet

Liabilities	₹	Assets	₹
Share capital	5,00,000	Fixed assets	7,50,000
Reserves and surplus	1,00,000	Stock	1,00,000
Long-term liabilities	3,00,000	Debtors	1,50,000
Current liabilities	2,00,000	Cash	1,00,000
	11,00,000		11,00,000

Working Notes:

1. Calculation of Cost of sales:

   Cost of Sales = Sales – Gross Profit = 12,00,000 – (25 ÷ 100 × 12,00,000)

   = 12,00,000 – 3,00,000 = ₹ 9,00,000

2. Calculation of Closing stock:

   $$\text{Closing Stock} = \frac{\text{Cost of Sales}}{\text{Stock Turnover Ratio}} = \frac{9,00,000}{9} = ₹\ 1,00,000$$

3. Calculation of Debtors:

   $$\text{Debtors} = \text{Total Sales} \times \text{Debt Collection Period} = 12,00,000 \times \frac{15}{12} = ₹\ 1,50,000$$

4. Calculation of Current asset:

   $$\text{Current Asset} = \frac{\text{Current Ratio}}{\text{Stock Ratio}} \times \text{Stock}$$

   $$= \frac{1.75}{0.5\,*} \times 1,00,000 = ₹\ 3,50,000$$

5. Calculation of Liquid assets:
   Liquid Assets = Current Assets – Stock = ₹ 3,50,000 – ₹ 1,00,000
   = ₹ 2,50,000

6. Calculation of Cash:
   Cash = Liquid Assets – Debtors = ₹ 2,50,000 – ₹ 1,50,000
   = ₹ 1,00,000

7. Calculation of Fixed assets:

   $$\text{Fixed Asset} = \frac{\text{Cost of Sales}}{\text{Fixed Asset Turnover}} = \frac{9,00,000}{1.2}$$

   = ₹ 7,50,000

8. Calculation of Current liabilities:

   $$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

*Stock Ratio = Current Ratio – Liquid Ratio
= 1.75 – 1.25 = 0.50

NOTES

or

$$\text{Current Liabilities} = \frac{\text{Current Assets}}{\text{Current Ratio}}$$

$$= \frac{₹\ 3,50,000}{1.75} = ₹2,00,000$$

9. Calculation of Share capital:

   Share Capital = Net Worth* – Reserves and Surplus**

   = 6,00,000 – 1,00,000

   = ₹ 5,00,000

10. Calculation of Long-term liabilities:

    Long-term liabilities = Share Capital × Gearing Ratio = 5,00,000 × 0.6

    = ₹ 3,00,000

Illustration 3.12: Using the information and the form given below, compute the balance sheet items for a firm having a sale of ₹ 36,00,000:

Sales/Total assets	3
Sales/Fixed assets	5
Sales/Current assets	7.5
Sales/Inventories	20
Sales/Debtors	15
Current ratio	2
Total assets/Net worth	2.5
Debt/Equity	1

Balance Sheet

Liabilities	₹	Assets	₹
Net worth	—	Fixed assets	—
Long-term debt	—	Inventories	—
Current liabilities	—	Debtors	—
		Liquid assets	
		Total current assets	—
Total liabilities	—	Total assets	—

(*C.A. Final*)

---

* Calculation of Net Worth

$$\text{Net Worth} = \frac{\text{Fixed Assets}}{\text{Fixed Assets to Net Worth}}$$

$$= \frac{7,50,000}{1.25}$$

$$= ₹\ 6,00,000$$

** Calculation of Reserves and Surplus

$$\text{Reserves and Surplus} = \frac{\text{Net worth} \times \text{Ratio of Reserves and surplus to capital}}{\text{Total Ratio****}}$$

$$= \frac{6,00,000 \times 0.2}{1.2}$$

$$= 1,00,000$$

****Calculation of Total Ratio

Shareholder's worth = Capital + Reserves and Surplus

Let Capital be 1, then shareholder's worth 1.2

i.e., (1 + 0.2). Thus total ratio = 1.2

Solution

Balance Sheet

Liabilities	₹	Assets		₹
Net worth	4,80,000	Fixed assets		7,20,000
Long-term debt	4,80,000	Inventories	1,80,000	
Current liabilities	2,40,000	Debtors	2,40,000	
		Liquid assets	60,000	
		Total current assets		4,80,000
Total liabilities	12,00,000	Total assets		12,00,000

Working Notes:

1. Calculation of Total Assets:

$$\frac{\text{Sales}}{\text{Total Assets}} = 3$$

By cross multiplication, we get

Total Assets = $\frac{\text{Sales}}{3}$

Substitute the value of sales in the above formula, we get

$$\text{Total Assets} = \frac{36,00,000}{3}$$

$$= ₹\ 12,00,000$$

On the same analogy we can find out the value of Fixed Assets, Current Assets, Inventories and Debtors as shown below:

2. Calculation of Fixed Assets:

$$\frac{\text{Sales}}{\text{Current Assets}} = 5$$

or $\text{Fixed Assets} = \frac{\text{Sales}}{5} = \frac{36,00,000}{5} = ₹\ 7,20,000$

3. Calculation of Current Assets:

$$\frac{\text{Sales}}{\text{Current Assets}} = 7.5$$

or $\text{Current Assets} = \frac{\text{Sales}}{7.5} = \frac{36,00,000}{7.5}$

$$= ₹\ 4,80,000$$

4. Calculation of Inventories:

$$\frac{\text{Sales}}{\text{Inventories}} = 20$$

$$\text{Inventions} = \frac{\text{Sales}}{20} = \frac{36,00,000}{20}$$

$$= ₹\ 1,80,000$$

NOTES

5. Calculation of Debtors:

$$\frac{\text{Sales}}{\text{Debtors}} = 15$$

or $$\text{Debtors} = \frac{\text{Sales}}{15}$$

$$= \frac{36,00,000}{15}$$

= ₹ 2,40,000

6. Calculation of Current Liabilities:

Current Ratio = 2

or $$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$$

By cross multiplication, we get

$$\text{Current Liabilities} = \frac{\text{Current Assets}}{2}$$

Substitute the value of current assets, we get

$$\text{Current Liabilities} = \frac{4,80,000}{2} = ₹\ 2,40,000$$

7. Calculation of Net Worth:

$$\frac{\text{Total Assets}}{\text{Total Worth}} = 2.5$$

or $$\text{Net Worth} = \frac{\text{Total Assets}}{2.5}$$

$$= \frac{12,00,000}{2.5} = ₹\ 4,80,000$$

8. Calculation of Debt:

$$\frac{\text{Debt}}{\text{Equity}} = 1$$

The analysis of Debt/Equity ratio reveals that amount of Debt shall be equal to equity. Since amount of equity is ₹ 4,80,000, therefore, the amount of debt shall also be ₹ 4,80,000.

9. Calculation of Liquid Assets:

Liquid Assets* = Current Assets – (Inventories + Debtors)
= 4,80,000 – (1,80,000 + 2,40,000)
= 4,80,000 – 4,20,000
= ₹ 60,000

*As proforma given in the illustration

NOTES

Check Your Progress

3. How are ratios classified on the basis of time?
4. Mention some examples of secondary ratios.
5. Name the ratio which signifies a very short-term liquidity of a business concern.
6. What does a low proprietary ratio indicate?
7. Why is return on owner's equity considered an effective indicator of a company's profitability?

3.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The interpretation of ratios can be made by comparing them with:
   - Previous figures — trend analysis;
   - Similar firms — inter-firm comparisons;
   - Targets — individual ratio set to meet the objective.
2. The purpose of ratio analysis is to help the reader of financial statements to understand the information shown by highlighting a number of key relationships.
3. On the basis of time to which the ratios computed belong, the ratio can be divided into structural ratios and trend ratios.
4. Examples of secondary ratios include turnover ratios, expenses ratios, earnings per share, etc.
5. Acid test ratio signifies a very short-term liquidity of a business concern.
6. A low proprietary ratio would indicate a relatively larger degree of security for the company.
7. The return on owner's equity is considered as an effective indicator of a company's profitability because it reflects the management's success in efficient utilization of the owner's investment.

3.6 SUMMARY

- Ratio analysis is one of the popular tools of financial statement analysis.
- A ratio is defined as the indicated quotient of two mathematical expressions and therefore expresses the relationship between two or more things.

NOTES

- Financial ratio expedites the analysis by reducing the large number of items involved to a relatively small set of readily comprehended and economically meaningful indicators.
- The trend analysis provides enough clues to the analyst for proper evaluation of the financial ratios.
- Inter-firm comparisons may claim the comparisons of similar ratios for a number of different firms in the same industry.
- Profit and loss ratios indicate the relationship between two such variables which have been taken from the profit and loss account.
- Balance sheet ratios attempts to express the relationship between two balance sheet items e.g., the ratio of stock to debtors, or the ratio of owner's equity to total equity.
- Inter-statement ratios deal with the relationship between operating and balance sheet items.
- Structural ratios exhibit the relation between two such items which relate to the same financial period.
- Trend ratios deal with the relationship between items over a period of time.
- Primary ratios refer to any ratio that relates to such objective is treated as primary ratio.
- Secondary ratios represent such ratios other than the primary ratio.
- The liquidity ratios indicate the liquidity position of a company.
- The current ratio compares the total current assets with the total current liabilities.
- Acid-test ratio provides an even more critical look at the ability of the company to meet its day-to-day obligations.
- Receivables turnover is the amount of period required for one complete cycle: From the time receivables are recorded through collection to the time new receivables are recorded.
- Leverage ratios measure the contribution of financing by owners compared with financing provided by the firm's creditors.
- Debt-equity ratio develops relationship between owned funds and the borrowed funds.
- Equity Ratio/Proprietary Ratio measures the proportion of the company's assets that are provided or claimed by the owners.
- Ratio of external equities to total assets ratio measures the proportion of the firm's assets that are financed by creditors.
- Fixed assets to net worth ratio indicates the percentage contributed by owners to the value of the fixed assets.

NOTES

- The ratio of current assets to net worth signifies the relationship between the current assets and net worth.
- Interest coverage ratio measures how many times a company could pay its interest expenses which is calculated by dividing interest expenses into earnings available for payment of interest expense.
- Profitability ratios are used to measure the ability of the firm to convert sales into profits and to earn profits on assets employed.
- Gross profit margin ratio indicates the relationship between gross profit and sales.
- The net profit margin ratio monitors the net profit made in relation to sales.
- Return on Assets/ Capital Employed measures relationship earning before interest and taxes and a firm's average assets.
- Return on owner's equity ratio is considered an effective indicator of the company's profitability because it reflects the success of management in the efficient utilization of the owner's investment.
- Return on equity capital monitors the profit made by the company in relation to its equity capital.
- The earnings per share represent average amount of net income earned by single equity share.
- Activity ratios measure the efficiency of a firm in employing the available resources.
- Fixed assets turnover ratio measures the efficiency in the utilization of fixed assets.
- Total Assets turnover ratio measures the overall performance and activity of the business organization.

3.7 KEY WORDS

- **Ratio:** It is defined as the indicated quotient of two mathematical expressions and as the relationship between two or more things.
- **Ratio analysis:** It helps the management to identify specific areas that reflect improvement or deterioration, as well as detect the trouble spots that may prevent the attainment of objectives.
- **Liquidity ratios:** These ratios measure the ability of a company to meet its current liabilities as they fall due.
- **Leverage ratios:** They measure the contribution of financing by owners compared with financing provided by the firm's creditors.
- **Profitability ratios:** These measure the ability of the firm to convert sales into profits and to earn profits on assets employed.

- **Turnover ratios:** They highlight the ability of management to convert or turnover the assets of the firm into sales.

NOTES

3.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What are the uses and limitation of Accounting Ratios?
2. Describe the various profitability ratios. How are they worked out?
3. "The return on Capital Employed is often taken as measure of efficiency of an organization". Comment.
4. What does the rate of return on assets employed tell about management?
5. A company has a 2 to 1 current ratio. List several reasons why this ratio may not be adequate.

Long-Answer Questions

1. What do you understand by Accounting Ratios? How does the ratio analysis technique help in the financial analysis?
2. State the significance of each of the following ratios and turnovers and tell how each is calculated:
   (i) Current Ratio
   (ii) Receivable Turnover
   (iii) Solvency Ratio
   (iv) Inventory Turnover
   (v) Return on Assets
3. Discuss the usefulness of the following ratios:
   (a) Acid-Test Ratio
   (b) Debt-Equity Ratio
   (c) Net Worth to Fixed Assets
   (d) Inventory Turnover.
4. What do you understand by Liquidity Ratio, Leverage Ratio, Profitability Ratio and Activity Ratio?
5. Discuss the ratios that determine the liquidity of a business.
6. The following is the balance sheet of SHE Ltd. as on 31st December, 2012:

	₹
Liabilities	
Share capital	2,00,000
General reserve	50,000
Profit and loss	30,500
Bank loan	70,000
Sundry creditors	1,50,000
Provision for tax	30,000
	5,30,500
Assets	
Buildings	2,00,000
Machinery	1,50,000
Inventory	1,00,000
Sundry debtors	60,000
Cash in hand	20,500
	5,30,500

NOTES

You are required to comment on the liquidity position of the concern.

7. Following accounting information is obtained relating to a limited company:

	₹
Sales	45,00,000
Cost of goods sold	25,00,000
	20,00,000
Administrative expenses	7,00,000
	13,00,000
Taxes	8,00,000
Net profit	5,00,000

Balance Sheet

Liabilities	₹	Assets	₹
7% Pref. share capital	30,00,000	Building	30,00,000
Equity share capital	15,00,000	Machinery	25,00,000
Reserves	5,00,000	Debtors	3,00,000
6% Debentures	8,00,000	Stock	3,00,000
Current liabilities	6,00,000	Goodwill	1,00,000
		Cash	2,00,000
	64,00,000		64,00,000

Opening stock was ₹ 3,00,000. Assume 360 days in a year. Compute the following ratios:

(i) Current ratio

(ii) Debtors ratio

(iii) Gross profit ratio

(iv) Net profit ratio.

NOTES

8. From the following Balance Sheet of a company you are required to calculate:

    Solvency ratio and

    Liquidity ratio

Balance Sheet

(*as on 31st December 2011*)

Liabilities	₹	Assets	₹
Equity capital	15,00,000	Building	8,00,000
6% Debentures	5,00,000	Machinery	8,00,000
Bank loan	2,50,000	Furniture	2,00,000
Sundry creditors	2,00,000	Stock	5,00,000
Bills payable	3,00,000	Debtors	4,00,000
Taxation	2,50,000	Cash	3,00,000
	30,00,000		30,00,000

9. From the information, you are required to prepare a Balance Sheet:
    1. Current ratio – 1.75
    2. Liquid ratio – 1.25
    3. Stock turnover ratio – 9
    4. Gross profit ratio – 25%
    5. Debt collection period – 1½ months
    6. Reserves and surplus to capital – 0.2
    7. Turnover to fixed assets – 1.2
    8. Capital gearing ratio – 0.6
    9. Fixed assets to net worth – 1.25
    10. Sales for the year – ₹ 24,00,000
10. Describe the effect of each of the transaction listed below on the indicated ratios. Will the ratio increase, decrease or remain unchanged?

Transaction	Ratio
(a) Payment of creditiors	(a) Current ratio of 2.5 : 1
(b) Change from FIFO to LIFO during period of rising of prices	(b) Inventory turnover
(c) Purchase of goods on credit	(c) Current ratio 2 to 1.
(d) Declaration of dividend on prefrential shares	(d) Equity ratio of 0.80
(e) Conversion of debentures into ordinary shares	(e) Return to long-term capital

11. The following information is collected from the financial statements of concern:
    1. Capital:
        (a) 7%, 2,000 Preference shares @ ₹ 100 each fully paid

(b) 4,000 Equity shares @ ₹ 100 each fully paid

2. Profits before tax 7,50,000
3. Rate of tax 40%
4. Depreciation ₹ 80,000
5. Market price of equity share ₹ 250
6. Proposed dividend 25 per cent

You are required to calculate Earnings Per Share.

Balance Sheet of Suman Ltd.

(*as on 31-12-2012*)

Liabilities	₹	Assets	₹
Share Capital:		Fixed Assets:	
9%, 10,000 Pre. shares @ ₹ 10 each	1,00,000	Buildings	3,50,000
30,000 Equity shares @ ₹ 10 each	3,00,000	Machinery	2,50,000
Reserves & Surplus:		Current Assets:	
General Reserve	50,000	Stock	50,000
Profit & Loss A/c	70,000	Debtors	70,000
6% Debentures	1,50,000	Cash	60,000
Bills payable	50,000		
Sundry creditors	60,000		
	7,80,000		7,80,000

Comment on the Solvency of the company.

3.9 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 4 FUNDS FLOW STATEMENT

NOTES

Structure

4.0 Introduction
4.1 Objectives
4.2 Funds Flow Statement : Meaning
4.3 Preparation of Funds Flow Statement
  4.3.1 Statement or Schedule of Changes in the Working Capital
  4.3.2 Statement of Sources and Applications of Funds
  4.3.3 Funds from Operation/Operational Profit
  4.3.4 Adjustment of Typical Items
  4.3.5 Preparation of Working Accounts and Notes (Hidden Transaction)
4.4 Answers to Check Your Progress Questions
4.5 Summary
4.6 Key Words
4.7 Self Assessment Question and Exercises
4.8 Further Readings

4.0 INTRODUCTION

The traditional balance sheet reveals the financial position of an organization by mentioning not only the sources of its resources but also the deployment of its resources. However, such a statement fails to identify the factors that are responsible for the change in the financial position of the organization between two financial periods. The identification and analysis of the said factors are essential as they have a direct impact on the working capital. It is pertinent to mention here that the management of working capital has always been recognized as a prerequisite for the smooth functioning of the organization. Therefore, the management always prefers to have a study that would help it to identify and analyse the factors that result in the change of working capital. In fact, such changes generally take place either due to an inflow or outflow of fund which is not revealed by the traditional balance sheet. The most popular framework used for this purpose is *statement of change in financial position.* The said statement aims to describe the changes in the financial position of a concern during a particular period. In fact, such a statement provides the basis for policy formulation by acting as a financial reporting media. The statement of changes in financial position is also known as *funds flow statement, where got were gone statement, management funds statement*, etc. However, we may use the term *funds flow statement* in this book.

4.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning and preparation of fund flow statement
- Describe the schedule of changes in working capital

- Examine the funds from operation
- Discuss the sources and applications

4.2 FUNDS FLOW STATEMENT : MEANING

NOTES

For a clear understanding of the funds flow analysis, the meaning of the terms *fund* and *flow* must be clear in one's mind.

Fund

The term *fund* can be used both in broader and narrow sense. In broader sense, it represents the working capital (current assets—current liabilities) of a concern while in narrow sense it represents only cash balances of a firm. Accordingly two statements can be prepared, viz.,

- *Funds flow statement:* A statement prepared on the basis of net current assets/working capital which is calculated by subtracting current liabilities from current assets.
- *Cash flow statement:* A statement that is governed by the narrow sense of fund, *i.e*., cash balances, and therefore, considers only receipts and payments of cash and transactions affecting cash position in its preparation.

Flow

Flow of fund refers to a business transaction that causes a change in the amount of fund (working capital) that exists before the maturity of the transaction. The flow of fund is recognized from the degree of change in the amount of working capital. If a transaction increases the amount of working capital, it is referred to as *source of fund* (inflow) whereas the transaction that decreases the amount of working capital results in the *application of fund* (outflow). If a transaction fails to cause a change in the amount of working capital, it does not amount to flow of fund. Suppose a company has a fund (Current assets–Current liabilities) of ₹ 1,20,000 on 31 December 2019. On 1January 2020, it purchased a computer costing ₹ 10,000 that brings decline in the amount of cash to the extent of ₹ 10,000 which in turn decreases the amount of working by ₹ 10,000. Accordingly, the amount of fund is reduced to ₹ 1,10,000 (1,20,000–10,000). The purchase of computer is treated as flow of fund (outflow) because it brought a change in the amount of working capital (fund) from ₹ 1,20,000 to ₹ 1,10,000.

After analysing the above example, it is clear that a change in the amount of working capital from ₹ 1,20,000 to ₹ 1,10,000 is the result of change in the two items of the company. Firstly, the amount of cash (a current item) is reduced by ₹ 10,000, and secondly, the amount of fixed asset (non-current item) is increased by the same amount. From this fact, we can conclude that:

- the flow of fund (change in working capital) occurs when a similar change is observed simultaneously in one current and one non-current account as a result of a single transaction;

- the transaction that involves only current accounts or only non-current accounts does not amount to flow of fund (change in working capital); and
- the flow of fund, *i.e.*, change in working capital has a similar impact both on current and non-current accounts. Symbolically, this can be expressed as

$$\sum\Delta WC = \sum\Delta\ CA = \sum\Delta\ NA$$

where, $\sum\Delta$ = aggregate change in

WC = working capital

CA = current accounts

NA = non-current accounts

Thus, the aggregate change in the working capital of a concern during a particular period can be computed by considering all changes which occurred either in the current accounts or in the non-current accounts. The changes which occurred in the current accounts as a result of flow of fund are reflected in a statement known as *schedule of changes in working capital*, whereas similar changes in the non-current accounts are shown in the *statement of changes in financial position* also known as *funds flow statement*.

In the above paragraphs we saw that the flow of fund is identified by analysing changes in current items and non-current items. Therefore, it becomes imperative to have a detailed list of current and non-current accounts.

Current Accounts

Current accounts consist of current assets and current liabilities, like:

- Current assets:
  - inventories
  - bills receivable
  - cash and bank balances
  - investments
  - sundry debtors
  - prepaid expenses (temporary)
- Current liabilities:
  - bills payable
  - sundry creditors
  - outstanding expenses and dues
  - proposed dividend
  - provision for taxation

- bank overdraft
- provision against current assets

Non-Current Accounts

Non-current accounts comprise fixed assets and long-term liabilities like:

- Fixed assets:
  - land and building
  - plant and machinery
  - furniture
  - long-term investment
  - goodwill
  - preliminary expenses
  - trade marks
  - patent rights
  - deferred expenses
  - discount on issue of shares/debentures
  - debit balances of profit and loss account
- Long-term liabilities:
  - share capital (equity and preferential)
  - share premium account
  - share forfeited account
  - capital redemption reserve
  - capital reserves
  - loans (long-term)
  - debentures
  - general reserves
  - provision for depreciation on fixed assets
  - bank loan
  - credit balances of profits and loss account

Illustration 4.1: Explain the effect of the below-mentioned transactions on fund (working capital):

(i) Purchase 6,000 shares at ₹ 10 each (temporary).

(ii) Further capital of ₹ 12,000 invested during the year.

(iii) Sale of unused plant (completely depreciated) for ₹ 40,000.

(iv) Paid cash to sundry creditors ₹ 30,000.

(v) Purchase of Insurance Policy (5 years) of ₹ 65,000.

NOTES

Solution

(i) This transaction will not affect the working capital (fund) because of its temporary nature. On one hand, current assets will be increased by temporary investment in shares to the extent of ₹ 60,000, and on the other hand, cash will go out of the business which will reduce the current asset by the same amount. Hence, current assets will not be affected.

(ii) The additional capital of ₹ 12,000 will increase the share capital, a non-current item, and at the same time, it will also increase cash, a current item. Thus it will result in the inflow of fund (source).

(iii) On the one hand, sale of unused plant will decrease the non-current asset (plant), and on the other hand, it will increase the amount of current asset (cash) by ₹ 40,000. Therefore, it the amount of fund will increase.

(iv) The transactions will change only current account, viz., cash and sundry creditors, leaving fund unaffected.

(v) Purchase of insurance policy will affect current asset (cash) on the one hand and non-current asset (insurance policy) on the other hand. Thus, the transaction will result in the outflow of fund to the extent of ₹ 65,000.

Funds Flow Statement

Funds flow statement indicates the amount of change in various balance sheet items between two accounting dates. It shows the sources and uses of funds during an accounting period. A funds statement is prepared in summary form to indicate changes (and trends if prepared regularly) occurring in items of financial conditions between two different balance sheet dates. According to Anthany, 1970:

> *The funds flow statement describes the sources from which additional funds were derived and the use to which these sources were put.*

Foulke, 1976 defines funds flow statement as:

> *A statement of sources and application of funds is a technical device designed to analyse the changes in the financial condition of a business enterprise between two dates.*

To the author of this book, funds flow statement *is a technique used to summarize the financial operations of an organization by studying the sources and application of funds during the accounting period*. Such a statement helps to identify the changes which have taken place and to demonstrate their impact upon the liquid resources of the business. It provided a clear indication of the changes which have taken place in the financial position of the enterprise, particularly for the people who are not well versed in reading balance sheets.

Uses of Funds Flow Statement

Funds flow statement plays a significant role in the evaluation of overall performance. Such a statement provides insights into the financial and investing operations of a business. It throws light on the financial strategy of a firm and guides financial experts in the interpretation and predictions of the same. The National Association of Accountants, 1971 in their bulletin list the following uses of this statement:

- estimating the amount of funds needed for the growth;
- improving rate of income on assets;
- planning temporary investments of surplus funds and planning for the working capital;
- securing additional funds when needed; and
- planning the payment of dividends.

Further, an effective funds flow analysis can offer the following benefits to a business firm:

- It helps the management in operating and investment decisions by providing a complete picture of sources and applications of funds.
- It guides experts in the formulation of future financial policies as it discloses the financial deficiencies of a specified period.
- It can make possible the efficient and economical utilization of future financial resources.
- It provides additional and significant data for decision making which is not presented by historical statements.
- It highlights the relationship between the working capital and the net income.
- It evaluates past financial performance by disclosing the means and uses of resources.
- It proves a meaningful technique for economic analysis.

Limitations of Funds Flow Statement

Despite its number of uses, the funds flow statement suffers from number of limitations which are listed below:

- It fails to cover as sufficient information as disclosed by income statement or balance sheet and as such cannot replace such statements.
- It is of secondary nature as it is prepared with the information as supplied by financial statements.
- The statement ignores the changes in working capital items, and therefore, fails to throw light on the financial position of the concern.

NOTES

- As this statement is simply re-arrangement of data as supplied by financial statement, the accuracy of the statement is doubtful.
- It is a crude device compared to financial statement because it does not touch non-fund items.
- It fails to reveal continuous changes.

Check Your Progress

1. What is the category under which trade marks and copyright are found?
2. Why is funds flow statement called a crude device compared to financial statement?

4.3 PREPARATION OF FUNDS FLOW STATEMENT

The preparation of funds flow statement involves decisions regarding the following two important facts:

- sources of information; and
- procedural framework.

Sources of Information

For the preparation of funds flow statement, the following information should be available:

- Two comparative balance sheets—one at the beginning and the other at the end of the period.
- Summarized income statement comprising non-fund* and non-operating** items required for computing funds from operation (Refer page 259).
- Statement of retained earnings to identify hidden information.
- Supplementary information regarding change in the non-current accounts like plant and machinery, building, share capital, debentures, etc.

This is the minimum information required for the purpose. Any information, in addition to that mentioned above shall make the funds flow analysis more effective.

* Non-fund items are the transactions that may cause change (increase or decrease) in the reported net profit but do not actually change the amount of fund (working capital). The best example of such an item can be depreciation on fixed assets.

** Non-operating items refer to transactions incidental to the business. For example, sale of fixed assets, profits from sale of assets, etc.

Procedural Framework

Procedural framework explains the procedure involved in the preparation of two statements, viz.,

- Statement or schedule of changes in working capital; and
- Statement of source and application of funds.

4.3.1 Statement or Schedule of Changes in the Working Capital

Statement or schedule of changes in the working capital is a statement that compares the change in the amount of current accounts (current assets and current liabilities) on two balance sheet dates and highlights its impact on working capital. The format of this statement is as follows:

Statement or Schedule of Changes in Working Capital

	Amount 1st Year (₹)	*Amount 2nd Year* (₹)	*Effect on Working Capital*	
			Increase (+) (₹)	*Decrease* (–) (₹)
A. *Current Assets*:				
Cash				
Trade debtors				
Stock				
Bill receivables				
Pre-payments				
Others				
Total Current Assets (A)				
B. *Current Liabilities:*				
Trade creditors				
Bills payable				
Outstanding expenses				
Provision for income tax				
Proposes dividend				
Others				
Total Current Liabilities (B)				
Working Capital (A – B)				
Increase/Decrease in working capital				

The changes in current accounts *i.e.*, current assets and current liabilities are to be computed by comparing the figures for such accounts in the current period with that of the previous period. The amount of change so computed for each item of the current account alongwith its impact on the amount of working capital is to be recorded in the schedule of change in working capital.

To analyze the effect on working capital as a result of change in current assets and current liabilities, the following facts should be considered:

Nature of transaction	Effect on working capital
1. Increase in current asset	Increase (+)
2. Decrease in current asset	Decrease (–)
3. Increase in current liabilities	Decrease (–)
4. Decrease in current liabilities	Increase (+)

Illustration 4.2: The comparative balance sheet of M/s Suman Ltd. as on 31st December, 2011 and 2012 were as follows:

Items	*31st December*	
	2011 (₹)	*2012* (₹)
Assets:		
Land and building	1,02,000	1,10,000
Plant and machinery	56,000	44,000
Sundry debtors	32,000	24,000
Inventory	70,000	61,000
Bills receivable	23,000	17,000
Cash and bank balance	40,000	47,000
Total	3,23,000	3,03,000

Items	*31st December*	
	2011 (₹)	*2012* (₹)
Liabilities:		
Share capital	1,40,000	1,30,000
Debentures	38,400	28,600
Reserves	97,900	1,02,550
Provision for taxation	2,700	2,850
Proposed dividend	24,000	18,000
Bills payable	10,000	10,000
Sundry creditors	10,000	11,000
Total	3,23,000	3,03,000

Prepare a schedule of changes in working capital.

Solution

Schedule of Changes in Working Capital

Items	*2011* (₹)	*2012* (₹)	*Effect on Working Capital*	
			Increase (+) (₹)	*Decrease* (–) (₹)
A. Current Assets:				
Sundry debtors	32,000	24,000		8,000
Inventory	70,000	61,000		9,000
Bills receivable	23,000	17,000		6,000
Cash and Bank balance	40,000	47,000	7,000	
Total Current Asset (A)	1,65,000	1,49,000		

B. Current Liabilities:				
Provision for taxation*	2,700	2,850		150
Proposed dividend*	24,000	18,000	6,000	
Bills payable	10,000	10,000		
Sundry creditors	10,000	11,000		1,000
Total Current Liabilities (B)	46,700	41,850		
Working Capital (A – B)	1,18,300	1,07,150		
Decrease in working capital		11,150	11,150	
	1,18,300	1,18,300	24,150	24,150

NOTES

Illustration 4.3: The summarized balance sheet of M/s Sugee Ltd. as on 31st March are given below:

Liabilities	*2011* (₹)	*2012* (₹)	*Assets*	*2011* (₹)	*2012* (₹)
Share capital	2,00,000	2,50,000	Land & Building	2,00,000	1,90,000
Debentures	50,000	90,000	Machinery	1,50,000	1,74,000
Profit & Loss A/c	30,500	30,600	Inventory	1,00,000	74,000
Bank loan	70,000	–	Sundry debtors	80,000	94,200
Creditors	1,50,000	1,35,200	Cash	500	8,600
Provision for taxation	30,000	35,000			
	5,30,500	5,40,800		5,30,500	5,40,800

You are required to prepare schedule of changes in working capital.

Solution

Schedule of Changes in Working Capital

Items			*Effect on Working Capital*	
	2011 (₹)	*2012* (₹)	*Increase* (+) (₹)	*Decrease* (–) (₹)
A. *Current Assets:*				
Inventory	1,00,000	74,000		26,000
Sundry debtors	80,000	94,200	14,200	
Cash	500	8,600	8,100	
Total Current Asset (A)	1,80,500	1,76,800		
B. *Current Liabilities:*				
Creditors	1,50,000	1,35,200	14,800	
Provision for taxation	30,000	35,000		5,000
Total Current Liabilities (B)	1,80,000	1,70,200		
Working capital (A – B)	500	6,600		
Increase in working capital	6,100			
	6,600	6,600	37,100	37,100

4.3.2 Statement of Sources and Applications of Funds

For the preparation of statement of sources and application of funds, we should be clear about the terms *sources* and *applications*.

Sources (inflow) refer to such business transactions that increase the amount of fund (working capital) and *applications* (outflow) means such transactions that result in the reduction of fund. As discussed already, such an increase or decrease in the fund may take place when current and non-current items are changed simultaneously as a result

* Both the items are treated as current items

of a transaction. The *increase* in the fund (source) is recorded as a *credit* and the *decrease* in the fund (application) is recorded as a debit. Therefore, credits represent sources of fund and debits represent application of fund. For better understanding of the concept of fund, important sources and uses of funds are summarized below:

Sources of Funds

- Operational profits or funds from operation;
- Issue of share capital or debentures;
- Sale of fixed assets and long-term investments (actual amount realized);
- Income from investments (dividend received); and
- Long-term loans.

Applications of Funds

- Repayment of capital (including redemption of preferential shares);
- Redemption of debentures;
- Payment of long-term loans;
- Purchase of investments;
- Purchase of fixed assets;
- Payment of taxation/proposed dividend*; and
- Operational loss

Thus, from the above discussion, we may conclude that:

- Increase in non-current assets = Applications of funds
- Decrease in non-current assets = Sources of funds
- Increase in non-current liabilities = Sources of funds
- Decrease in non-current liabilities = Applications of funds

The dual-aspect concept of accounting suggests that the total amount of sources of funds must reconcile with the total amount of applications of funds. This principal is similar to that of the balance sheet principal where total assets are equal to total liabilities. Therefore,

- Sources of funds = Applications of funds
- Increase in liabilities + Decrease in assets = Decrease in liabilities + Increase in assets.

Format of Funds Flow Statement

Different formats are used for this purpose depending upon the objective of analysis. However, the commonly used format is 'account form' (as given

* If treated as non-current items

below) where sources are shown on the left side and the application of funds on right side of the statement.

NOTES

Statement of Sources and Application of Funds

Sources	**(₹)**	***Applications***	**(₹)**
Issue of shares	xx	Redemption of shares	xx
Issue of debentures	xx	Redemption of debentures	xx
Sale of fixed assets	xx	Purchase of fixed assets	xx
Sale of long-term investments	xx	Repayment of loans	xx
Bank loans	xx	Purchase of investments	xx
Long-term loans	xx	Operational loss	xx
Operational profit	xx	Increase in working capital (as per schedule of change in WC)	xx
Decrease in working capital (as per schedule of changes in WC)	xx		
	xx		xx

4.3.3 Funds from Operation/Operational Profit

The main source of fund for an enterprise is the *funds from operation* that represents actual amount of profit as generated by the business. For the funds flow statement, the net profit as disclosed by profit and loss account is adjusted in order to calculate the actual amount of fund from operation. This is done to find the effect of the items such as depreciation and distribution of profits (general reserve, dividend, provision for taxation), loss from sale of asset, etc., on net profit which actually do not result in the outflow of fund but were treated so in the preparation of profit and loss account of the firm. In the same way, the impact of items like dividend received on investment, capital gains, etc., which do not represent income (inflow) from business operation, must be treated properly. The procedure for adjusting profits as disclosed by profits and loss account in order to ascertain funds from operation is as under:

	(₹)	(₹)
Net profits as per profit and loss account		
Add: Items which do not result in the outflow of fund:		xxx
• Depreciation charged during the year**	xxx	
• Loss on sale of fixed assets/investments**	xxx	
• Capital expenditure (like goodwill, preliminary expenses, patents) written off against profit and loss account**	xxx	
• Provision for income tax*/proposed dividend*	xxx	
• Any other item	xxx	xxx
Less: Items which do not result in the inflow of funds:		
• Gains on sale of fixed assets/investment	xxx	
• Dividend received on investment (credited to profit and loss account)	xxx	
• Any other item	xxx	xxx
Profit from business operation or fund from operation		xxxx

** For details refer adjustment of typical items
* If treated as non-current items

4.3.4 Adjustment of Typical Items

Before attempting a practical problem, we must be familiar with the treatment of some typical transactions. Accordingly, the discussion that follows deals with adjustment procedure of typical transactions in fund flow analysis.

- ***Provision for Taxation:*** There are two approaches to adjust the item of provision for taxation, viz.,
  - *As a current item:* Under this approach, the item of provision for taxation is treated as current liability and accordingly it is adjusted in the schedule of changes in the working capital. However, while attempting a practical problem on fund flow analysis, the item of tax (if any) given outside the trial balance should be omitted under this approach. The logic behind the omission is that such an adjustment item (actual payment of tax) will affect two current accounts, *i.e.*, cash and provision for taxation. Therefore, the transaction will not result in the flow of fund (application).
  - *As a non-current item:* Under this approach, it is considered as an appropriation of profits and thus a non-current liability. Accordingly, the amount of current provision for taxation is to be adjusted in the funds from operation and the actual payment of tax appears in the funds flow statement as an application.

  Note: Students may note that it is desirable to treat the item of provision for taxation as current liability as generally it is the immediate obligation of the concern to pay tax to the government. As such, it seems somewhat irrational to treat provision of tax as an appropriation of profit.
- ***Proposed Dividend:*** It has the same treatment as that of provision for taxation.
- ***Interim Dividend:*** It is the dividend paid in between two balance sheet dates. It is a non-operating item and as such is adjusted in the calculation of profits from operation.
- ***Depreciation:*** The depreciation is a non-fund item that does not result in the flow of cash. It involves simply a book entry without actual payment of cash. This entry in the book account which debits profit and loss account and credits the fixed asset account, reduces the amount of profit and the book value of the fixed assets. As such, depreciation does not affect the amount of fund (working capital). Thus, the amount of depreciation is adjusted in the computation of profits from operation.
- ***Preliminary Expenses:*** Preliminary expenses like depreciation is a non-fund item which simply involves a book entry. Every year a portion of such expenses is written off by debiting them to profit and loss account. However, this treatment to preliminary expenses neither results in the flow of fund nor it is considered as an operating charge. Thus, the amount of preliminary expenses written off during the current

period is to be added back to the net profit as to determine funds from operation.

- ***Goodwill :*** The amount of goodwill written off does not involve flow of funds but requires simply book entry—debited to the profit and loss account. Therefore, while computing the funds from operations, the amount of goodwill written off during the current period is added back to the net profits for the year.
- ***Creation of the Reserves:*** Since reserves are created out of profits, therefore, such reserves constitute an appropriation of profit and not an operating charge against profits. Further, the creation of reserve does not affect the amount of fund. Therefore, the current amount of the reserve is to be added back to the net profit to determine funds from operation.
- ***Gain or Loss from the Sale of a Fixed asset:*** Firms often transfer gain or loss from the sale of asset to profit and loss account. The treatment of this item in the funds flow analysis is that it is to be adjusted in the computation of funds from operation, this being a non-funds item. Thus, the gain from the sale of the asset is deducted from the net profit and vice-versa to determine profits from operation.

4.3.5 Preparation of Working Accounts and Notes (Hidden Transaction)

Preparation of working accounts and notes is an important step in the funds flow statement. The need for such accounts and notices arises to find out some hidden information required for the funds flow statement. The information like depreciation, provision for taxation, sale or purchase of assets etc. is made available by this step. The following illustration will help in the clear understanding of this attempt.

Example: The information relating to X Co. Ltd. regarding a machinery stands as:

	31st Dec. (2011) (₹)	*31st Dec. (2012)* (₹)
Value of Machinery	1,00,000	2,25,000
Depreciation on machinery during the year 2012		30,000

Calculate the actual amount of application used for the purchase of machinery during the year 2012.

Solution: Apparently it looks that the amount of application for the purchase of machinery during the year 2012 is ₹ 1,25,000 (2,25,000 – 1,00,000). But actually it is ₹ 1,55,000 (1,25,000 + 30,000). The value of machinery as on 31st December, 2012 (2,25,000) is the adjusted amount from which the

amount of depreciation has already been deducted. In order to calculate the actual amount of application for the purchase of machinery, the amount of depreciation should be added back to the value of machinery. Thus, actual amount will be:

	(₹)
Value of machinery as on 31st December, 2012	2,25,000
Add: Depreciation charged during the year	30,000
	2,55,000
Less: Value of machinery as on 31st December, 2011	1,00,000
Value of machinery purchased during the year (Application)	1,55,000

The value of machinery purchased during the year 2012 can also be ascertained with the help of an account stated as follows:

Machinery Account

Particulars	**(₹)**	***Particulars***	**(₹)**
To Balance b/d	1,00,000	By depreciation	30,000
To Cash-purchases (balancing figure)	1,55,000	By Balance c/d	2,25,000
	2,55,000		2,55,000

In the above account, entries regarding opening and closing balances, depreciation, profit or loss from sale of machinery, profit or loss on revaluation etc. are to be recorded. The balancing figure in the account will represent either sale proceeds or acquisition cost of the machinery.

In the same way, ledger accounts may be prepared to find out inflow/outflow of funds from other non-current assets and liabilities like investment account, building account, capital account, debentures account etc.

Illustration 4.4

Balance Sheet of Self Ridges Ltd.

Liabilities	***31st Dec. 2011*** **(₹)**	***31st Dec. 2012*** **(₹)**	***Assets***	***31st Dec. 2011*** **(₹)**	***31st Dec. 2012*** **(₹)**
Share capital	2,00,000	2,30,000	Plant and machinery	1,90,000	2,10,000
Trade creditors	80,000	1,00,000	Building	1,05,000	1,37,000
Bank loan	40,000	25,000	Inventory	20,000	27,000
Mortgage	–	25,000	Trade debtors	40,000	55,000
Profit & Loss A/c	65,000	83,000			
Cash	30,000	34,000			
	3,85,000	4,63,000		3,85,000	4,63,000

Prepare from the above comparative balance sheet:

(a) A schedule of change in working capital; and

(b) Funds flow statement.

Solution

NOTES

Schedule of Changes in Working Capital

Items	*2011* (₹)	*2012* (₹)	*Effect on Working Capital* Increase (+) (₹)	Decrease (–) (₹)
A. *Current Assets:*				
Trade debtors	40,000	55,000	15,000	
Inventory	20,000	27,000	7,000	
Cash	30,000	34,000	4,000	
Total Current Asset (A)	90,000	1,16,000		
B. *Current Liabilities:*				
Trade creditors	80,000	1,00,000		20,000
Total Current Liabilities (B)	80,000	1,00,000		
Working Capital (A – B)	10,000	16,000		
Increase in working capital	6,000			6,000
	16,000	16,000	26,000	26,000

Working Note:

The increase in working capital is ascertained by subtracting working capital of 2011 from the working capital of 2012. The working capital for 2011 and 2012 is calculated as under:

Working capital as on 31st December, 2011:

= Total Current Assets – Total Current Liabilities

(as on 31st Dec., 2011) (as on 31st Dec., 2011)

= ₹ 90,000 – ₹ 80,000 = ₹ 10,000

Working capital as on 31st December, 2012:

= Total Current Assets – Total Current Liabilities

(as on 31st Dec., 2012) (as on 31st Dec., 2012)

= ₹ 1,16,000 – ₹ 1,00,000 = ₹ 16,000

Therefore, increase in working capital = Working capital as on 31st Dec., 2012 – Working capital as on 31st Dec., 2011

= ₹ 16,000 – ₹ 10,000 = ₹ 6,000

Funds Flow Statement

Sources	*Amount* (₹)	*Applications*	*Amount* (₹)
Share capital (2,30,000 – 2,00,000)	30,000	Plant and machinery (2,10,000 – 1,90,000)	20,000
Mortgage	25,000	Building (1,37,000 – 1,05,000)	32,000
Profits/Funds from operation (83,000 – 65,000)	18,000	Bank loan (40,000 – 25,000)	15,000
		Increase in working capital	6,000
	73,000		73,000

Note: In the above illustration, working accounts and notes have not been prepared as there is no adjustment item. Now, in the next few illustrations we will study the adjustment of typical items and also the preparation of working accounts.

Illustration 4.5: From the following balance sheets of Oriental Company Ltd., prepare (a) schedule of changes in working capital, and (b) Funds flow statement.

Liabilities	*31st Dec. 2009 (₹)*	*31st Dec. 2010 (₹)*	*Assets*	*31st Dec. 2009 (₹)*	*31st Dec. 2010 (₹)*
Capital	1,20,000	1,50,000	Plant	1,00,000	1,25,000
Sundry creditors	37,000	25,000	Land and building	75,000	90,000
Bills payable	15,000	17,000	Patents rights	7,000	9,500
Profit & Loss A/c	60,000	69,000	Cash	17,000	23,000
			Sundry debtors	33,000	13,500
	2,32,000	2,61,000		2,32,000	2,61,000

Additional Information:

Depreciation of ₹ 20,000 and ₹ 25,000 have been charged on plant, land and building respectively in 2010.

Solution

Statement of Changes in Working Capital

Items	*2009 (₹)*	*2010 (₹)*	*Effect on Working Capital (₹)*	
			Increase (+)	*Decrease (–)*
A. *Current Assets:*				
Cash	17,000	23,000	6,000	
Sundry debtors	33,000	13,500		19,500
Total Current Asset (A)	50,000	36,500		
B. *Current Liabilities:*				
Sundry creditors	37,000	25,000	12,000	
Bills payable	15,000	17,000		2,000
Total Current Liabilities (B)	52,000	42,000		
Working Capital (A – B)	(–) 2,000	(–) 5,500		
Decrease in working capital	(–) 3,500		3,500	
	(–) 5,500	(–) 5,500	21,500	21,500

Funds Flow Statement

Sources	*Amount (₹)*	*Applications*	*Amount (₹)*
Capital	30,000	Purchase of plant[2]	45,000
Funds from operations[1]	54,000	Purchase of land and building[3]	40,000
Decrease in working capital	3,500	Purchase of patents	2,500
	87,500		87,500

NOTES

Working Notes:

1. Calculation of funds from operation:

	(₹)	(₹)
Profit as per P&L A/c (closing balance)		69,000
Add: Depreciation	20,000	
Plant	25,000	45,000
Land and building		1,14,000
Less: Opening balance of profit		60,000
Funds from operation		54,000

2. Calculation of plant purchased during the year:

Plant Account

	₹		₹
To Balance b/d	1,00,000	By Depreciation	20,000
To Cash—purchase (Balancing figure)	45,000	By Balance c/d	1,25,000
	1,45,000		1,45,000

3. Calculation of land and building purchases during the year:

Land and Building Account

	₹		₹
To Balance b/d	75,000	By Depreciation	25,000
To Cash—purchase (Balancing figure)	40,000	By Balance c/d	90,000
	1,15,000		1,15,000

Illustration 4.6: From the following balance sheets of MAS Ltd. prepare: (i) Statement of change in working capital (ii) Fund flow statement

MAS Ltd.
(Balance Sheet)

Liabilities	*I Year* (₹)	*II Year* (₹)	*Assets*	*I Year* (₹)	*II Year* (₹)
Share Capital:					
Equity shares	4,50,000	6,00,000	Goodwill	1,90,000	1,40,000
6% Redeemable pref. shares	2,25,000	1,50,000	Plant	1,60,000	2,50,000
Profit & Loss A/c	60,000	75,000	Building	2,40,000	1,95,000
Proposed dividend	55,000	67,000	Inventories	92,000	1,25,000
Trade creditors	72,000	90,000	Trade Debtors	1,75,000	2,35,000
Bill payable	32,000	25,000	Bill receivables	45,000	57,000
Provision for taxation	60,000	72,000	Cash	52,000	77,000
	9,54,000	10,79,000		9,54,000	10,79,000

Additional Information:

1. An interim dividend of ₹ 35,000 has been paid in II year.
2. Payment of income-tax ₹ 52,000 was paid during II year.
3. Depreciation of ₹ 35,000 and ₹ 42,000 have been charged on plant and building respectively in II year.

Solution

Schedule of Changes in Working Capital

Items	*I Year* (₹)	*II Year* (₹)	*Effect on Working Capital* *Increase* (+) (₹)	*Decrease* (–) (₹)
A. *Current Assets:*				
Inventories	92,000	1,25,000	33,000	
Trade debtors	1,75,000	2,35,000	60,000	
Bills receivables	45,000	57,000	12,000	
Cash	52,000	77,000	25,000	
Total Current Asset (A)	3,64,000	4,94,000		
B. *Current Liabilities:*				
Proposed dividend	55,000	67,000		12,000
Trade creditors	72,000	90,000		18,000
Bills payable	32,000	25,000	7,000	
Provision for taxation	60,000	72,000		12,000
Total Current Liabilities (B)	2,19,000	2,54,000		
Working Capital (A – B)	1,45,000	2,40,000		
Increase in working capital	95,000			95,000
	2,40,000	2,40,000	1,37,000	1,37,000

Funds Flow Statement

Sources	(₹)	*Applications*	(₹)
Issue of equity share	1,50,000	Redemption of pref. share capital	75,000
Sale of building[1]	3,000	Purchase of plant[3]	1,25,000
Funds from operation[2]	1,77,000	Interim dividend	35,000
		Increase in working capital	95,000
	3,30,000		3,30,000

Working Notes:

1. *Calculation of building sold during II year:*

Building Account

	(₹)		(₹)
To Balance b/d	2,40,000	By Depreciation	42,000
		By Balance c/d	1,95,000
		To Cash-sale (Balancing figure)	3,000
	2,40,000		2,40,000

2. *Calculation of funds from operation:*

	(₹)	(₹)	(₹)
Profit as given (II year – I year) (75,000 – 60,000)			15,000
Add: Non-operating items:			
Depreciation on:			
Plant	35,000		
Building	42,000	77,000	
Goodwill (written off) (1,90,000 – 1,40,000)		50,000	
Interim dividend		35,000	1,62,000
Funds Flow Operation			1,77,000

3. *Calculation of plant purchase during II year:*

Plant Account

	(₹)		(₹)
To Balance b/d	1,60,000	By Depreciation	35,000
To Cash—purchase (Balancing figure)	1,25,000	By Balance c/d	2,50,000
	2,85,000		2,85,000

Note: The adjustment items (additional information) relating to provision for taxation and proposed dividend have been omitted because of being treated these iteme as current liabilities.

Alternatively, if these items are treated as non-current liabilities then:

(i) The current provison of such items will be added to profits in the calculation of funds from operation.

(ii) Actual payment on these accounts during the current year will appear in the funds flow statement as application. However, under this alternative these items will not be shown in the schedule of change in working capital and as a result, the working capital will increase by ₹ 24,000 (12,000 + 12,000). Now the practical solution of this problem will take the following form.

Schedule of Changes in Working Capital

Items	*I Year* (₹)	*II Year* (₹)	*Effect on Working Capital*	
			Increase (+) (₹)	*Decrease* (–) (₹)
A. *Current Assets:*				
Inventories	92,000	1,25,000	33,000	
Trade debtors	1,75,000	2,35,000	60,000	
Bills receivables	45,000	57,000	12,000	
Cash	52,000	77,000	25,000	
Total Current Asset (A)	3,64,000	4,94,000		

B. *Current Liabilities:*				
Trade creditors	72,000	90,000		18,000
Bills payable	32,000	25,000	7,000	
Total Current liabilities (B)	1,04,000	1,15,000		
Working Capital (A – B)	2,60,000	3,79,000		
Increase in working capital	1,19,000			1,19,000
	3,79,000	3,79,000	1,37,000	1,37,000

Funds Flow Statement

Sources	***Amount (₹)***	***Applications***	***Amount (₹)***
Issue of equity share	1,50,000	Redemption of pref. share capital	75,000
Sale of building	3,000	Purchase of plant[2]	1,25,000
Profits from operation[1]	3,08,000	Interim dividend	35,000
		Payment of proposed dividend[3] (Ist Year)	55,000
		Payment of Income Tax[4]	52,000
		Increase in working capital	1,19,000
	4,61,000		4,61,000

Working Accounts and Notes (For alternative method) (₹)

1. Computation of Funds from Operation			
Profit as given (II year – I year) (75,000 – 60,000)			15,000
Add: Non-operating items:			
Depreciation:			
Plant	35,000		
Building	42,000	77,000	
Provision for taxation[4]		64,000	
Proposed dividend		67,000	
Interim dividend		35,000	
Goodwill (written off)		50,000	2,93,000
Funds Flow Operation			3,08,000

2. Calculation of the building sold during the year—same as in the first alternative.
3. It has been assumed that the provisioin for dividend made in first year is paid in second year.

NOTES

4. **Provision for Taxation A/c**

	(₹)		(₹)
To Bank (Paid)	52,000	By Bal. b/d	60,000
To Balance c/d	72,000	By P&L A/c Being provision made during the year (Balancing figures)	64,000
	1,24,000		1,24,000

Illustration 4.7: The balance sheet of Double Company Ltd. at the end of 2008 and 2009 are given below:

Liabilities	*2008* (₹)	*2009* (₹)	*Assets*	*2008* (₹)	*2009* (₹)
Capital	10,00,000	**12,00,000**	Cash	**3,00,000**	3,80,000
Trade creditors	2,80,000	**2,60,000**	Trade debtors	**3,30,000**	2,00,000
Bill payable	80,000	**60,000**	Inventories	**3,00,000**	2,00,000
Bank overdraft	1,00,000	–	Prepaid expenses	**8,000**	6,000
Provision for tax	1,50,000	**1,30,000**	Fixed assets	**10,00,000**	9,60,000
General reserve	1,60,000	**1,60,000**	Goodwill	–	1,20,000
Profit and Loss account	1,68,000	**56,000**			
	19,38,000	**18,66,000**		**19,38,000**	18,66,000

Additional Information:

(i) A dividend of ₹ 68,000 was paid in 2009;

(ii) Asset of another company were purchased at ₹ 2,00,000 payable in 10,000 shares of ₹ 20 each. The assets included stock of ₹ 20,000; fixed assets ₹ 60,000, and goodwill ₹ 1,20,000;

(iii) Income tax paid in 2009 was ₹ 20,000;

(iv) Net profit in 2009 was ₹ 76,000 before charging tax;

Prepare a statement showing sources and uses of funds during 2009.

Solution

Schedule of Changes in Working Capital

Particulars	*2008* (₹)	*2009* (₹)	*Effect on Working Capital*	
			Increase (+) (₹)	*Decrease* (–) (₹)
A. *Current Assets:*				
Cash	3,00,000	3,80,000	80,000	
Trade debtors	3,30,000	2,00,000		1,30,000
Inventories	3,00,000	2,00,000		1,00,000
Prepaid expense	8,000	6,000		2,000
Total Current Asset (A)	9,38,000	7,86,000		
B. *Current Liabilities:*				
Trade creditors	2,80,000	2,60,000	20,000	

NOTES

Bills payable	80,000	60,000	20,000	
Bank overdraft	1,00,000	–	1,00,000	
Provision for taxation	1,50,000	1,30,000	20,000	
Total Current Liabilities (B)	6,10,000	4,50,000		
Working Capital (A – B)	3,28,000	3,36,000		
Net increase in working capital	8,000			8,000
	3,36,000	3,36,000	2,40,000	2,40,000

Funds Flow Statement

Sources	**(₹)**	***Applications***	**(₹)**
Funds from operation	56,000	Payment of dividend	68,000
Issue of shares	20,000*	Net increase in working capital	8,000
	76,000		76,000

Working Notes:

I. **Fixed Assets Account**

	(₹)		**(₹)**
To Balance b/d	10,00,000	By Balance c/d	9,60,000
To Share capital	60,000	By Depreciation	1,00,000
		(balancing figure)	
	10,60,000		10,60,000

Note: The increase in fixed asset of ₹ 60,000 due to share capital will not be deemed as application.

II. **Share Capital Account**

	(₹)		**(₹)**
To Balance c/d	12,00,000	By Balance b/d	10,00,000
		By Stock (source)	20,000
		By Goodwill	1,20,000
		By Fixed assets	60,000
	12,00,000		12,00,000

III. **Calculation of Funds from Operation**

		₹
Net profit for 2009 (1,68,000 – 56,000)		(–)1,12,000
Add: Non-fund and non-operating items already debited to profit and loss account:		
Depreciaton of fixed assets(I)	1,00,000	
Dividend	68,000	
		(+)1,68,000
Funds from operation		56,000

Check Your Progress

3. Mention the two important facts which are considered in the preparation of the funds flow statement.
4. What does an increase in non-current liabilities indicate wrt to funds?
5. How is goodwill treated in the fund flow statement?
6. Why is preparation of working accounts and notes needed?

NOTES

4.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Trade marks and patent rights are fixed assets under non-current accounts.
2. Funds flow statement is considered a crude device compared to financial statement because it does not touch non-fund items.
3. The preparation of funds flow statement involves decisions regarding the following two important facts:
   - Sources of information; and
   - Procedural framework
4. The increase in non-current liabilities indicates sources of funds.
5. The amount of goodwill written off does not involve flow of funds but requires simply book entry — debited to the profit and loss account. Therefore, while computing the funds from operations, the amount of goodwill written off during the current period is added back to the net profits for the year.
6. The need for preparation of working accounts and notes arises to find out some hidden information required for the funds flow statement. The information like depreciation, provision for taxation, sale or purchase of assets etc. is made available by this step.

4.5 SUMMARY

- Statement of changes in financial position is a statement designed to describe the changes in the financial position of a concern during a particular period.
- Fund in a broader sense, represents the working capital (current assets – current liabilities) of a concern while as in narrow sense it represents only cash balances of a firm.

NOTES

- Flow of fund would mean when a business transaction causes a change in the amount of fund (working capital) that exists before the maturity of the transaction.
- Funds Flow Statement is a technique used to summarize the financial operations of a concern by studying the sources and application funds during the accounting period.
- Statement or Schedule of changes in working capital is a statement that compares the change in the amount of current accounts, current assets and current.
- Sources refer to a situation when a transaction increases the amount of fund (working capital).
- Application means a transaction that results in the reduction of fund.
- The dual-aspect concept of accounting suggests that the total amount of sources of funds must reconcile with the total amount of application of funds.

4.6 KEY WORDS

- **Flow of fund:** It refers to a business transaction that causes a change in the amount o fund (working capital) that exists before the maturity of the transaction.
- **Funds flow statement:** It is a statement prepared on the basis of net current assets/working capital which is calculated by subtracting current liabilities from current assets.
- **Schedule of changes in working capital:** It is a statement which reflects the changes which have occurred in the current accounts as a result of flow of funds.

4.7 SELF ASSESSMENT QUESTION AND EXERCISES

Short-Answer Questions

1. What is a Funds Flow Statement? List its managerial uses.
2. Explain the terms:
   (i) Funds
   (ii) Flow of Funds
   (iii) Funds Flow Statement
3. Mention the major sources and applications of working capital.
4. What information would you require to prepare a statement of sources and application?

Long-Answer Questions

1. Discuss the procedure for the preparation of Funds Flow Statement.
2. Write short note on:
   (a) Non-operating items
   (b) Funds from operations
   (c) Current Accounts.
3. The comparative balance sheet of MAS Ltd., as on 31st December, 2008 and 2009 were as follows:

Assets	*2008* (₹)	*2009* (₹)	*Liabilities*	*2008* (₹)	*2009* (₹)
Building	5,00,000	5,10,000	Share capital	5,50,000	7,00,000
Furniture and fixtures	2,20,000	2,50,000	Debentures	3,00,000	3,15,000
Plant	3,00,000	3,40,000	Profit and Loss	3,55,000	3,75,000
Stock	1,25,000	1,75,000	account	50,000	40,000
Bills receivables	60,000	90,000	Bills payable	30,000	20,000
Cash balance	80,000	85,000	Bank overdraft		
	12,85,000	14,50,000		12,85,000	14,50,000

You are given the following additional information:

1. Depreciation on building and plant during the year were ₹ 20,000 and 10,000 respectively.
2. Dividend amounting to ₹ 10,000 was paid during 2009.

   Prepare a funds flow statement and a statement of changes in working capital.

4. The summarized balance sheet of ESS BEE Enterprises on 31st of Dec. 2008 and 2009 are given below:

Balance Sheet of ESS BEE Enterprises

Liabilities	*2008* (₹)	*2009* (₹)	*Assets*	*2008* (₹)	*2009* (₹)
Trade creditors	85,000	60,000	Bank balance	1,00,000	1,00,000
Accounts payable	40,000	50,000	Trade debtors	80,000	1,00,000
Bank overdraft	15,000	17,000	Stock	70,000	60,000
Provision for income tax	60,000	80,000	Building	3,20,000	3,50,000
P & L A/c	2,20,000	2,70,000	Plant	3,50,000	4,20,000
Share capital	8,00,000	9,20,000	Investment	3,00,000	3,67,000
	12,20,000	13,97,000		12,20,000	13,97,000

The following additional information is obtained from the general ledger:

(i) Income-tax paid during the year amounting to ₹ 45,000

(ii Depreciation charged to building and plant during the year was ₹ 40,000 and 35,000 respectively.

You are required to prepare:

(i) Schedule of charges in working capital, and

(ii) Funds flow statements.

NOTES

5. The Balance Sheet of MS Ltd. as on 31st Dec. 2010 and 2011 are given below:

Liabilities	2010 (₹)	2011 (₹)	Assets	2010 (₹)	2011 (₹)
Equity share capital	2,00,000	3,40,000	Plant	2,40,000	2,60,000
6% preference Share	2,50,000	3,20,000	Building	2,50,000	2,70,000
capital	40,000	45,000	Preliminary expenses	60,000	40,000
Reserves	60,000	48,000	Inventories	65,000	73,000
Provision for taxation	90,000	90,000	Sundry debtors	70,000	96,000
Proposed dividend	1,00,000	—	Cash balances	1,50,000	1,45,000
Profit and loss A/c	70,000	75,000	Receivable	75,000	99,000
Sundry creditors	60,000	40,000			
Bills payable	40,000	25,000			
Bank overdraft	9,10,000	9,83,000		9,10,000	9,83,000

Additional Information:

(i) Tax liability in respect of 2010 comes to ₹ 35,000.

(ii) During the year 2011 a plant costing ₹ 42,000 (accumulated depreciation ₹ 25,000) was sold for ₹ 20,000.

(iii) Actual dividend paid during the year 2011 amounted to ₹ 55,000.

Prepare

(i) Funds Flow statement; (ii) Schedule of changes in working capital.

6. The following are the summaries of the Balance Sheets of SBG Ltd. as at 31st December, 2009 and 31st December, 2010.

Liabilities	2009 (₹)	2010 (₹)	Assets	2009 (₹)	2010 (₹)
Sundry creditors	1,18,500	1,23,405	Cash	7,500	8,100
Bills payable	1,01,340	34,575	Sundry debtors	2,55,525	2,17,875
Bank overdraft	1,78,530	–	Bills receivable	6,945	2,205
Provision for taxation	1,20,000	1,50,000	Inventories	3,33,120	2,92,110
Profit & Loss A/c	1,19,070	1,23,660	Building	4,45,500	4,32,750
Reserves	1,50,000	1,50,000	Plant	3,38,850	3,48,600
Share capital	6,00,000	7,80,000	Goodwill	–	60,000
	13,87,440	13,61,640		13,87,440	13,61,640

Additional Information:

(i) During the year 31st December, 2010 an interim dividend of ₹ 74,000 was paid.

(ii) The assets of another company were purchased for ₹ 1,80,000 payable in full paid shares of company. These assets consisted of stock ₹ 64,920, machinery ₹ 55,080 and Goodwill ₹ 60,000. In addition sundry purchases of plant was made totaling to ₹ 16,950.

(iii) Income tax paid during the year amounting to ₹ 75,000.

(iv) The net profit for the year before tax was ₹1,87,590.

You are required to prepare:

(i) Schedule of changes in working capital; and

(ii) Statement showing the sources and application of funds for the year 2010.

NOTES

4.8 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

BLOCK II
CASH FLOW STATEMENT AND ANALYSIS

NOTES

UNIT 5 CASH FLOW STATEMENT AND ANALYSIS

Structure

5.0 Introduction
5.1 Objectives
5.2 Meaning Of Cash Flow Statement
  5.2.1 Difference between Cash Flow Statement and Fund Flow Statement
  5.2.2 Concept of Cash Flow
  5.2.3 Sources and Application of Cash
  5.2.4 Calculation of Cash From Operations
  5.2.5 Forms of Cash Flow Statement
5.3 Preparation Of Cash Flow Statement as per AS 3
5.4 Answers to Check Your Progress Questions
5.5 Summary
5.6 Key Words
5.7 Self Assessment Questions and Exercises
5.8 Further Readings

5.0 INTRODUCTION

Cash flow has rightly been recognized as life stream of a successful business as there is hardly any business transaction that does not involve cash. Many research studies have revealed that profitable ventures have failed because of insufficient cash and unprofitable ones have continued for long periods because sufficient cash was somewhat pumped into the business system. Consequently, management of cash has emerged as a strategic area for the growth and prosperity of firms in contemporary business, and therefore, has received considerable attention of both academicians and practitioners. Recognizing the significance of management of cash in contemporary business as a strategic resource, business firms need to control and monitor cash flows efficiently and effectively so that adequate cash is available to meet the requirements of the business. To attain this objective, business firms make use of *cash flow statement* which provides them the details about cash received and spent on various activities during the period under study.

5.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of Cash flow statement

- Discuss the difference between funds flow statement and cash flow statement
- Describe the preparation of cash flow statement as per Accounting Standard 3

5.2 MEANING OF CASH FLOW STATEMENT

Cash flow statement attempts to measure the inflows and outflows of cash that result from various business activities during a particular accounting period. In cash flow analysis, attempts are made to explain the causes of change in the cash position of a concern during the period. Such an analysis help the business firms in identifying the areas of business that either have surplus or deficit cash and accordingly help them in the creation and utilization of cash effectively. Thus, cash flow statement is a tool that managers utilize to evaluate their ability to manage cash efficiently and effectively. Therefore, a cash flow statement focuses on cash rather than on working capital as advocated by a fund flow statement. The Institute of Cost and Works Accountants of India, 2000 defines cash flow statement as '*a statement setting out the flow of cash under distinct heads of sources of funds and their utilization to determine the requirements of cash during the given period and to prepare for its adequate provision*'.

To the author of this book, *a cash flow statement is a statement which provides a detailed explanation for the change in a firm's cash during a particular period by indicating the firm's sources and uses of cash during that period*. Such a statement is only useful for management and does not have any utility for external users.

5.2.1 Difference between Cash Flow Statement and Fund Flow Statement

In fact, cash flow statement and fund flow statement do not differ much with each other as both the statements depict the same picture—transactions which result in the change of financial position during a particular accounting period. Commenting on the difference between these two statements Myer[2], 1961 is of the opinion that though 'these statements containing essentially the same story of financial events' have certain differences between them as summarized below:

- A fund flow statement gives a broad perspective by indicating changes in working capital whereas a cash flow statement indicates specifically the inflow and outflow of cash which is the one of the components of working capital as used in a fund flow statement. Therefore, cash flow is a narrow term as compared to fund flow.
- Fund flow analysis is governed by the mercantile system of accounting, i.e., accrual basis. On the other hand, cash system of accounting is used for the preparation of cash flow statement.

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- The amount of information as contained by a fund flow statement provides sufficient basis for long-range planning. In contrast, a cash flow statement tends to be more useful in short-run analysis.
- A fund flow statement attempts to identify the inflows and outflows of funds while cash flow statement is prepared with a purpose to recognize the inflows and outflows of cash.
- Under fund flow analysis, the changes in working capital items are shown in a separate statement known as 'schedule of changes in working capital' because fund flow statement fails to indicate such changes. In contrast, in cash flow analysis changes in both current and non-current accounts appear in the cash flow statement. Therefore, the preparation of a separate statement to indicate the changes in working capital components does not arise in cash flow analysis.

5.2.2 Concept of Cash Flow

The basic objective of cash flow analysis is to identify the business transactions technically known as cash flow that cause the change in the firms' cash and cash equivalents. In fact, cash flow can result either in inflow or outflow of cash and cash equivalent. Cash inflow refers to a business transaction that generates cash, and therefore, technically it is referred to as source. In the same way, cash outflow refers to a business transaction that utilizes cash and therefore, technically it is known as application. In fact, such cash flows can result from the following three major activities of an enterprise:

- Operating activities include such activities that have direct impact on the enterprise's business results. Therefore, such activities either result in operating incomes or operating expenses;
- Investment activities refers to such activities that result in either purchase or sale of long-term assets;
- Financial activities include activities that are responsible for the change in the company's capital structure and therefore are concerned with the capital and debt of the business.

To meet the above-mentioned objective of cash flow analysis, one has to use the same approach that was devised to analyse funds flow (net working capital) in Unit 4. However, such an approach would call for slight modification to make it appropriate for the analysis of cash flows. In cash flow analysis, the non-current accounts, *i.e.,* fixed assets and long-term liabilities are given the same treatment as is recommended for such items in fund flow analysis. However, the changes in current accounts (except cash) which were reflected in the schedule of changes in working capital in case of fund flow analysis are now reflected in cash flow statement along with the changes in non-current accounts. The cash flow can be determined symbolically as:

NOTES

$$\Delta C = \Delta A - \Delta L$$

where

Δ = Change in C = Cash

A = Total assets except cash L = Total liabilities

The above equation clearly reveals that change in cash can be computed by analysing the changes that occurred in all non-current and current accounts except cash. The impact on cash position of a concern by the change in balance sheet items is given below:

Change in balance sheet items	*Impact on cash*
–Increase in current assets other than cash	Outflow of cash
–Decrease in current assets other than cash	Inflow of cash
–Increase in non-current assets	Outflow of cash
–Decrease in non-current assets	Inflow of cash
–Increase in current liabilities	Inflow of cash
–Decrease in current liabilities	Outflow of cash
–Increase in long-term liabilities	Inflow of cash
–Decrease in long-term liabilities	Outflow of cash

5.2.3 Sources and Application of Cash

The major sources and uses of cash are mentioned below:

Sources of Cash

- Issue of capital
- Issue of long-term debts such as debentures
- Sale of assets
- Cash from operation
- Decrease in current assets
- Increase in current liabilities

Application of Cash

- Redemption of capital
- Purchase of fixed assets
- Repayment of long-term debt
- Cash lost in operation
- Increase in current assets
- Increase in current liabilities

5.2.4 Calculation of Cash From Operations

The major source of cash for a business is cash from trading operations. When the accounting system is based on cash system, the net profit as shown by profit and loss represents the cash from operations. However, in actual practice, commercial organizations maintain mercantile system of accounting. With the result the profit as disclosed by profit and loss account is not considered the actual cash from operation as it includes many transactions of notional cash. Thus, net profit as shown in profit and loss account is to be adjusted as to arrive at actual cash from operation. The non-cash transactions like outstanding incomes/expenses, prepaid expenses, etc., should be adjusted. Further all non-fund items such as depreciation, preliminary expenses written off, etc., are also to be adjusted as is done in case of fund flow statement. A detailed proforma of the statement showing computation of cash from operations is given below:

Statement Showing Computation of Cash from Operations

Particulars	*Amount* (₹)
Net profit (as given in P&L A/c)	
Add:	
(a) *Decrease in Current Assets:*	
Sundry debtors	
Bill receivable	
Prepaid expenses	
Accrued income	
(b) *Increase in Current Liabilities:*	
Sundry creditors	
Bills payable	
Outstanding expenses	
Income received in advance	
(c) *Non-fund items debited to Profit and Loss Account:*	
Depreciation	
Goodwill written off	
Loss on sale of assets	
Preliminary expenses written off	
Less:	
(a) *Increase in Current Assets:*	
Sundry debtors	
Bill receivable	
Prepaid expenses	
Accrued income	

NOTES

(b) *Decrease in Current Liabilities:*	
Sundry creditors	
Bill payable	
Outstanding expenses	
Income received in advance	
(c) *Non-fund items credited to Profit and Loss Account:*	
Profit on sale of assets	
Cash from operations	

Note: The current assets and current liabilities will not include cash balances and bank overdraft respectively in the determination of cash from operations.

Illustration 5.1: From the following balance sheet of M/s S.B. Company Ltd., as on Dec. 31, 2010 and 2011, calculate cash from operation:

Liabilities	2010 (₹)	2011 (₹)	Assets	2010 (₹)	2011 (₹)
Share capital	1,20,000	1,50,000	Building	65,000	65,000
P&L A/c	45,000	65,000	Machinery	90,000	1,20,000
Sundry creditors	30,000	22,000	Stock	20,000	15,000
Outstanding expenses	1,200	400	Sundry debtors	18,000	20,000
Bill payable	18,000	22,000	Cash at bank	17,000	32,300
			Cash in hand	4,200	7,100
	2,14,200	2,59,400		2,14,200	2,59,400

Solution

Calculation of Cash from Operation

			(₹)
Net profits as given (65,000 – 45,000)			20,000
Add:			
(a) Decrease in Current Assets:			
Stock		5,000	
(b) Increase in Current Liabilities:			
Bills payable		4,000	9,000
			29,000
Less:			
(a) Increase in Current Assets:			
Sundry debtors		2,000	
(b) Decrease in Current Liabilities:			
Sundry creditors	8,000		
Outstanding expenses	800	8,800	
			10,800
Cash from Operations			18,200

5.2.5 Forms of Cash Flow Statement

A cash flow statement can be prepared in two forms:

(i) Report Form, and

(ii) Account Form.

The format of a cash flow statement (Report Form) is given below:

Cash Flow Statement for the Period Ending

Particulars	***Amount (₹)***
Balances at the Beginning:	
Cash in hand	
Cash at bank	
Add: *Cash Inflows:*	
Issue of share capital	
Issue of debentures	
Long-term loans	
Sale of fixed assets	
Cash from operations	
Less: *Cash Outflows:*	
Redemption of share capital	
Redemption of debentures	
Payment of long-term debts	
Purchase of fixed assets	
Non-trading payments e.g, dividends, taxes, etc.	
Cash lost in operations	
Balances at the end	
Cash in hand	
Cash at bank	

Alternatively, it may be shown in an account form as follows:

Cash Flow Statement for the Period Ending

Sources	***Amount (₹)***	***Application (₹)***	***Amount (₹)***
Balance in the Beginning:		Cash Outflows:	
Cash in hand		Redemption of share capital	
Cash at bank		Redemption of debentures	
Add: Cash Inflows:		Payment of long-term debts	
Issue of share capital		Purchase of fixed assets	
Issue of debentures		Non-trading payments	
Long-term loans		Cash lost in operation	
Sale of fixed assets		Balance at the end:	
Cash from operations		Cash in hand	
		Cash at bank	

Illustration 5.2: Prepare cash flow statement from the comparative balance sheet of S. B. Company Ltd. as given in Illustration 5.1.

Solution

NOTES

Cash Flow Statement

for the period ending December 31, 2011

Particulars	(₹)	(₹)
Balances at Beginning:		
Cash in hand	4,200	
Cash at bank	17,000	21,200
Add: Cash inflows		
Issue of share capital	30,000	
Cash from operation	18,200	48,200
		69,400
Less: Cash outflows:		
Machinery	30,000	30,000
Balance at the End:		
Cash in hand	7,100	
Cash at bank	32,300	39,400

Advantages of Cash Flow Statement

A cash flow statement is a vital analytical tool that helps a financial manager in effective management of cash. As a result, the application of cash flow statement offers the following advantages to the users:

- It ensures effective planning and coordination of financial operations. The analysis of cash flow statement provides a financial manager sufficient basis to assess the position of the firm's cash that can be generated internally as against the total amount of cash required to meet future obligations of the concern. With the result, proper arrangements can be made well in advance for the availability of adequate cash if the future cash requirements of the business cannot be met internally.
- A comparison of the cash flow statement with the projected cash flow statement is very useful in evaluating cash forecasting.
- It may be an useful tool for the proper allocation of the firm's cash among its various activities/divisions.

The analysis of cash flow statement can also help the management in formulating appropriate financial policies regarding debts, credits, collections, dividends, etc.

- It helps the management in investment decisions.
- A comparative analysis of the firm's cash flow statements enables a financial manager to assess the liquidity position of the firm.
- A careful study of cash flow statement provides answer to some typical questions like why cash position of the concern is tight, in spite of high incomes or vice-versa.

NOTES

Adjustment of Typical Items

The treatment of the typical items like depreciation, dividend, profit on sale of assets, etc., in the cash flow analysis is the same as is recommended for such items in the fund flow analysis. However, the provision for taxation is treated as a non-current item. The actual amount of tax paid during the year is shown in the cash flow statement as cash outflow. The current provision of taxation is added back to the amount of profit in order to ascertain cash from operation.

Preparation of Working Accounts and Notes (Hidden Transaction)

The preparation of working accounts and notes is as important in cash flow analysis as is in case of fund flow analysis. The procedure for ascertaining the hidden information is the same as is devised in the case of fund flow analysis.

Illustration 5.3: The following schedule shows balance sheets in condensed form of ESS EMM Co. Ltd., at the beginning and end of the year 2011.

Liabilities	*1-1-2011 (₹)*	*31-12-2012 (₹)*	*Assets*	*1-1-2011 (₹)*	*31-12-2012 (₹)*
Sundry creditors	55,000	83,000	Cash balances	25,000	18,000
Bills payable	20,000	16,000	Sundry debtors	1,60,000	2,00,000
Provision for tax	40,000	50,000	Bills receivable	20,000	30,000
Proposed dividend	42,000	50,000	Stock in trade	77,000	1,09,000
6% Debentures	1,50,000	1,00,000	Machinery	80,000	2,00,000
General reserve	40,000	70,000	Building	2,00,000	1,70,000
Profit and loss account	30,000	48,000	Goodwill	1,15,000	90,000
Capital	3,00,000	4,00,000			
	6,77,000	8,17,000		6,77,000	8,17,000

The following information concerning the transactions is available:

(i) An interim dividend of ₹ 20,000 was paid in 2011.

(ii) Depreciation of ₹10,000 and ₹ 20,000 have been charged on Machinery and Building respectively in 2011.

(iii) Income-tax ₹ 35,000 was paid during the year.

Solution

Calculation of Cash from Operations

		(₹)
Net profits as given (48,000 – 30,000)		18,000
Add:		
(a) Increase in Current Liabilities:		
Sundry creditors	28,000	28,000
(b) Non-fund items Debited to P&L A/c:		
Goodwill	25,000	

NOTES

	Depreciation:			
	Machinery	10,000		
	Building	20,000	30,000	
	Proposed dividend		50,000	
	Interim dividend		20,000	
	Provision for tax		45,000	
	General reserve		30,000	2,00,000
				2,46,000
Less:				
(a)	Increase in current assets:			
	Sundry debtors	40,000		
	Stock in trade	32,000		
	Bills receivable	10,000	82,000	
(b)	Decrease in current liabilities:			
	Bills payable	4,000	4,000	86,000
	Cash from Operations			1,60,000

Statement of Sources and uses of Cash

			(₹)
Cash Balance at the Beginning:			25,000
Add:	Cash Inflows:		
	Issue of share capital	1,00,000	
	Cash from operation	1,60,000	
	Sale of building	10,000	2,70,000
			2,95,000
Less:	Cash Outflows:		
	Redemption of debentures	50,000	
	Purchase of machinery	1,30,000	
	Payment of dividend	42,000	
	Payment of interim dividend	20,000	
	Payment of tax	35,000	2,77,000
	Cash balance at the end		18,000

Working Notes:

Provision for Tax Account

	(₹)		(₹)
To Tax paid	35,000	By Balance b/d	40,000
To Balance c/d	50,000	By P&L A/c (balancing figure)	45,000
	85,000		85,000

Machinery Account

	(₹)		(₹)
To Balance b/d	80,000	By Depreciation	10,000
To Purchases (balancing figure)	1,30,000	By Balance c/d	2,00,000
	2,10,000		2,10,000

NOTES

Building Account

	(₹)		(₹)
To Balance b/d	2,00,000	By Depreciation	20,000
		By Balance c/d	1,70,000
		By Closing balance (Sale of building)	10,000
	2,00,000		2,00,000

Illustration 5.4: The income statement and balance sheet of an enterprise for the year ended 31st December, 2012 was as follows:

(a) Income statement for the year ended 31st Dec, 2012 (₹)

Sales	5,00,000
Cost of sales	3,50,000
Tax provision	40,000
Dividend provision	20,000

(b) Balance sheet

Liabilities	1-1-2012 (₹)	31-12-2012 (₹)	Assets	1-1-2012 (₹)	31-12-2012 (₹)
Capital	1,20,000	1,20,000	Fixed Assets (Gross)	1,40,000	1,90,000
Reserve	40,000	1,30,000	Depreciation	(40,000)	(50,000)
Debentures	70,000	80,000	Inventory	90,000	75,000
Sundry creditors	20,000	40,000	Bills receivable	55,000	1,72,000
Bill payable	18,000	26,000	Cash balances	23,000	29,000
Dividend provision	—	20,000			
	2,68,000	4,16,000		2,68,000	4,16,000

You are required to prepare cash flow statement for the year ended Dec. 31, 2012.

Solution

Calculation of Profit from Operation

	(₹)
Sales	5,00,000
Less: Cost of sales	3,50,000
Profit before tax	1,50,000
Less: Tax	40,000
Net profit after tax	1,10,000

Calculation of Cash from Operation (₹)

Net profit after tax			1,10,000
Add:			
(a) Decrease in Current Assets:			
Inventory		15,000	
(b) Increase in Current Liabilities:			

NOTES

	Sundry creditors	20,000		
	Bill payable	8,000	28,000	
(c)	Non-fund items Debited to P&L A/c:			
	Dividend	20,000		
	Depreciation	10,000	30,000	73,000
Less:				1,83,000
(a)	Increase in Current Assets:			
	Bill receivable		1,17,000	1,17,000
	Cash from operation			66,000

Cash Flow Statement

for the year ended 31st December 2012

		(₹)
Cash balance as on 1-1-2012		23,000
Add: Cash Inflows:		
Cash from operation	66,000	
Debentures	10,000	
		76,000
		99,000
Less: Cash Outflows:		
Purchase of fixed assets	50,000	
Dividend	20,000	
		70,000
Cash balance as on 31st December, 2012		29,000

Illustration 5.5: Shabnam Co. Ltd. wants to prepare a cash flow statement for the year ended December 31, 2012 from the comparative balance sheets given below:

Comparative Balance Sheets

Liabilities	2011 (₹)	2012 (₹)	Assets	2011 (₹)	2012 (₹)
Share capital	5,00,000	6,50,000	Machinery	2,80,000	3,20,000
Debentures	3,40,000	2,00,000	Building	3,50,000	3,50,000
Sundry Creditors	1,60,000	67,000	Investment at cost	2,40,000	2,65,000
Provision for doubtful debts	4,500	3,000	Goodwill	70,000	55,000
Profit and Loss Account	75,500	1,20,000	Bank balance	40,000	–
Bank overdraft	–	45,000	Inventory	60,000	70,000
			Bills receivable	40,000	25,000
	10,80,000	10,85,000		10,80,000	10,85,000

The following additional information is available:

(i) Depreciation charged to profits on machinery for the year 2012 amounts to ₹ 40,000.

(ii) Dividends paid during the year 2012 were as follows:

(a) 2011 (final) on the capital as on 31-12-2011 at 10% *less* 25% tax

(b) 2012 (interim) 5% free of tax.

NOTES

Explain how the overdraft of ₹ 45,000 as on 31st December 2012 has arisen.

Solution

Calculation of Cash from Operation

				(₹)
Profit as given (1,20,000 – 75,500)				44,500
Add:				
(a) Decrease in Current Assets:				
Bills receivable			15,000	
(b) Non-fund items Debited to P&L A/c:				
Depreciation on Machinery			40,000	
Goodwill			15,000	
Dividend Paid:				
Final 2006	37,500			
Interim 2007	32,500	70,000	1,25,000	1,40,000
				1,84,500
Less:				
(a) Increase in Current Assets:				
Inventory			10,000	
(b) Decrease in Current Liabilities:				
Sundry Creditors			93,000	
(c) Non-fund items Credited to P&L A/c:				
Decrease in provision for doubtful debts			1,500	
				1,04,500
Cash from Operation				80,000

Cash Flow Statement

for the year ended 31st Dec., 2012

Cash balance on 1-1-2012			40,000
Add: Cash Inflows:			
Share capital		1,50,000	
Cash from operation		80,000	
			2,30,000
			2,70,000
Less: Cash Outflows:			
Purchase of machinery		80,000	
Purchase of investment		25,000	
Redemption of debentures		1,40,000	
Dividends paid:			
Final - 2006	37,500		
Interim - 2007	32,500	70,000	
			3,15,000
Overdraft on Dec. 31, 2012			45,000

NOTES

Workings:

Machinery Account

	(₹)		(₹)
To Balance b/d	2,80,000	By Balance c/d	3,20,000
To Purchases (balancing figure)	80,000	By Depreciation	40,000
	3,60,000		3,60,000

Illustration 5.6: Mr Smart submits the following statement in respect of his financial position as on 31st March, 2011 and 2012:

Balance Sheet

Liabilities	*31-3-2011* (₹)	*31-3-2012* (₹)	*Assets*	*31-3-2011* (₹)	*31-3-2012* (₹)
Sundry creditors	60,000	45,000	Building	1,20,000	90,000
Bills payable	45,000	50,000	Investments	60,000	60,000
Capital	1,75,000	1,20,000	Bills receivable	30,000	2,500
			Stock in trade	30,000	35,000
			Cash balances	40,000	27,500
	2,80,000	2,15,000		2,80,000	2,15,000

Mr Smart further reports that there were no drawings and no purchase or sale of buildings. You are required to prepare a Statement of Cash Flow.

Solution

As reported by Mr Smart there were no drawings during the year and as such the decrease in the amount of capital from ₹ 1,75,000 to ₹ 1,20,000 i.e., ₹ 55,000 has been due to trading loss during the year. Accordingly the cash lost in operation is computed as under:

Computation of Cash Lost in Operation

		(₹)
Trading Loss (1,75,000 – 1,20,000)		(–) 55,000
Add:		
(a) Decrease in Current Assets:		
Bills receivable	27,500	
(b) Increase in Current Liabilities:		
Bill payable	5,000	
(c) Non-fund items Debited to P&L A/c:		
Depreciation on building	30,000	(+) 62,500
		(+) 7,500
Less:		
(a) Increase in Current Assets:		
Stock in trade	5,000	
(b) Decrease in Current Liabilities:		
Sundry creditors	15,000	
		(–) 20,000
Cash lost in Operation		(–) 12,500

NOTES

Cash Flow Statement
for the year ended 31st March, 2012

	(₹)
Cash balance on 1-1-2011	40,000
Add: Cash Inflows:	–
	40,000
Less: Cash Outflows:	
Cash lost in operation	12,500
Cash balance as on 31-3-12	27,500

Check Your Progress

1. What are operating activities?
2. What is the impact on case of the increase in non-current assets?
3. How is cash from operations arrived at in commercial organizations maintaining mercantile system of accounting?

5.3 PREPARATION OF CASH FLOW STATEMENT AS PER AS 3

The following are the salient features of the AS 3 (Revised): Cash Flow Statements, issued by the Council of the Institute of Chartered Accountants of India in March 1997. This Standard supersedes AS 3, Changes in Financial Position, issued in June 1981.

The standard has been made mandatory for all enterprises from accounting period commencing or after 1.4.2001.

Objectives

Information about the cash flows of an enterprise is useful in providing users of financial statements with a basis to assess the ability of the enterprise to generate cash and cash equivalents and needs of the enterprise to utilize those cash flows. The economic decisions that are taken by users require an evaluation of the ability of an enterprise to generate cash and cash equivalents and the timings and certainty of their generation.

The statement deals with the provisions of information about the historical changes in cash and cash equivalents of an enterprise by means of a cash flow statement which classifies cash flows during the period from operating, investing and financing activities.

Scope

(1) An enterprise should prepare a cash flow statement and should present it for each period for which financial statements are presented.

(2) Users of an enterprise's financial statements are interested in how the enterprise generates and uses cash and cash equivalents. This is the case regardless of the nature of the enterprise's activities and irrespective of whether cash can be viewed as the product of the enterprise, as may be the case with a financial enterprise. Enterprises need cash for essentially the same reasons, however different their principal revenue-producing activities might be. They need cash to conduct their operations, to pay their obligations, and to provide returns to their investors.

Benefits of Cash Flow Information

(1) A cash flow statement, when used in conjunction with the other financial statements, provides information that enables users to evaluate the changes in net assets of an enterprise, its financial structure (including its liquidity and solvency), and its ability to affect the amounts and timing of cash flows in order to adapt to changing circumstances and opportunities. Cash flow information is useful in assessing the ability of the enterprise to generate cash and cash equivalents and enables users to develop models to assess and compare the present value of the future cash flows of different enterprises.

(2) It also enhances the comparability of the reporting of operating performance by different enterprises because it eliminates the effects of using different accounting treatments for the same transactions and events.

(3) Historical cash flow information is often used as an indicator of the amount, timing and certainty of future cash flows. It is also useful in checking the accuracy of past assessments of future cash flows and in examining the relationship between profitability and net cash flow and the impact of changing prices.

Definitions

The following terms are used in this statement with the meanings specified:

(1) *Cash* comprises cash on hand and demand deposits with banks.

(2) *Cash equivalents* are short term, highly liquid investments that are readily convertible into known amounts of cash and which are subject to an insignificant risk of changes in value.

(3) *Cash flows* are inflows and outflows of cash and cash equivalents.

(4) *Operating activities* are the principal revenue-producing activities of the enterprise and other activities that are not investing or financing activities.

(5) *Investing activities* are the acquisition and disposal of long-term assets and other investments not included in cash equivalents.

(6) *Financing activities* are activities that result in changes in the size and composition of the owner's capital (including preference share capital in the case of a company) and borrowings of the enterprise.

NOTES

Presentation of a Cash Flow Statement

The cash flow statement should report cash flows during the period classified by operating investing and financing activities.

(1) **Operating activities** Cash flows from operating activities are primarily derived from the principal revenue-producing activities of the enterprise. Therefore, they generally result from the transactions and other events that enter into the determination of net profit or loss. Examples of cash flows from operating activities are:

(*a*) cash receipts from the sale of goods and the rendering of services

(*b*) cash receipts from royalties, fees, commissions, and other revenue

(*c*) cash payments to suppliers for goods and services

(*d*) cash payments to and on behalf of employees

(*e*) Cash receipts and cash payments of an insurance enterprise for premiums and claims, annuities and other policy benefits

(*f*) cash payments or refunds of income taxes unless they can be specifically identified with financing and investing activities

(*g*) cash receipts and payments relating to futures contracts, forward contracts, option contracts and swap contracts when the contracts are held for dealing or trading purposes.

Modes of reporting cash flows from operating activities

An enterprise may report cash flows from operating activities using either any of the following methods:

(*a*) *Direct Method*: In case of this method major classes of gross cash receipts and gross cash payments are disclosed; or

(*b*) *Indirect Method*: In case of this method net profit or loss is adjusted for the effects of transactions of a non-cash nature, any deferrals or accruals of past or future operating cash receipts or payments, and items of income or expense associated with investing or financing cash flows.

(2) **Investing activities** Examples of cash flows arising from investing activities are:

(*a*) cash payments to acquire fixed assets (including intangibles). These payments include those relating to capitalized research and development costs and self-constructed fixed assets

(*b*) cash receipts from disposal of fixed assets (including intangibles)

(*c*) cash payments to acquire shares, warrants, or debt instruments of other enterprises and interests in joint ventures (other than payments for those instruments considered to be cash equivalents and those held for dealing or trading purposes)

(*d*) cash receipts from disposal of shares, warrants, or debt instruments of other enterprises and interests in joint ventures (other than receipts from those instruments considered to be cash equivalents and those held for dealing or trading purposes)

(*e*) cash advances and loans made to third parties (other than advances and loans made by financial enterprise)

(*f*) cash receipts from the repayment of advances and loans made to third parties (other that than advances and loans of a financial enterprise)

(*g*) cash payments for futures contracts, forward contracts, option contracts, and swap contract except when the contracts are held for dealing or trading purposes, or the payments and classified as financing activities

(*h*) cash receipts from futures contracts, forward contracts, option contracts, and swap contracts except when the contracts are held for dealing or trading purposes, or the receipts are classified as financing activities

(3) **Financing activities** Examples of cash flows arising from financing activities are:

(*a*) cash proceeds from issuing shares or other similar instruments

(*b*) cash proceeds from issuing debentures, loans, notes, bonds, and other short-or long-term borrowings

(*c*) cash repayments of amounts borrowed

Reporting Cash Flows from Investing and Financing Activities

An enterprise should report separately major classes of gross cash receipts and gross cash payments arising from investing and financing activities, except to the extent that cash flows described in paragraph 6 are reported on a net basis.

Reporting Cash Flows on a Net Basis

(1) Cash flows arising from the following operating, investing or financing activities may reported on a net basis:

(*i*) Cash receipts and payments on behalf of customers when the cash flows reflect the activities of the customer rather than those of the enterprise.

Examples of cash receipts and payments referred above are as follows:

(*a*) the acceptance and repayment of demand deposits by a bank;

(*b*) funds help for customers by an investment enterprise; and

(*c*) rents collected on behalf of, and paid over to, the owners of properties.

(*ii*) Cash receipts and payments for items in which the turnover is quick, the amounts large, and the maturities are short.

Examples of cash receipts and payments referred above are advances made for, and the repayments of:

(*a*) Principal amounts relating to credit card customers;

(*b*) the purchase and sale of investments; and

(*c*) other short-term borrowings, for example, those which have a maturity period of three months or less.

(2) Cash flows arising from each of the following activities of a financial enterprise may be reported on a net basis:

(*a*) Cash receipts and payments for the acceptance and repayment of deposits with a fixed maturity date;

(*b*) The placement of deposits with and withdrawal of deposits from other financial enterprises; and

(*c*) Cash advances and loans made to customers and the repayment of those advances and loans.

Disclosure

(1) **Components of cash and cash equivalents** An enterprise should disclose the components of cash and cash equivalents and should present a reconciliation of the amounts in its cash flow statement with the equivalent items reported in the balance sheet.

(2) **Other disclosures** An enterprise should disclose, together with a commentary by management, the amount of significant cash and cash equivalent balances held by the enterprise that are not available for use by it.

Check Your Progress

4. How are cash from operating activities to be reported under the indirect method as per AS 3?
5. What are the disclosures to be presented as per the AS 3?

5.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Operating activities include such activities that have direct impact on the enterprises' business results. Therefore, such activities either result in operating incomes or operating expenses.

2. The increase in non-current assets results in outflow of cash.
3. Under mercantile system of accounting, the profit as disclosed by the profit and loss account is not considered the actual cash from operations as it includes many transactions of notional cash. Thus, net profit as shown in profit and loss account is to be adjusted as to arrive at actual cash from operations including non-cash and non-fund items.
4. As per AS 3, in the case of indirect method net profit or loss is adjusted for the effects of transactions of a non-cash nature, any deferrals or accruals of past or future operating cash receipts or payments, and items of income or expense associated with investing or financing cash flows.
5. The following are the disclosures to be presented as per AS 3:
   (i) Components of cash and cash equivalents An enterprise should disclose the components of cash and cash equivalents and should present a reconciliation of the amounts in its cash flow statement with the equivalent items reported in the balance sheet.
   (ii) Other disclosures An enterprise should disclose, together with a commentary by management, the amount of significant cash and cash equivalent balances held by the enterprise that are not available for use by it.

5.5 SUMMARY

- A cash flow statement is a statement which provides a detailed explanation for the change in a firm's cash during a particular period by indicating the firm's sources and uses of cash during that period.
- Cash flow statement is governed by the cash system of accounting.
- The basic aim of cash flow analysis is to determine what transactions caused the cash balance to change during a particular period.
- Cash flow statement is governed by the cash system of accounting.
- To determine cash flow, the non-current accounts *i.e.*, fixed assets and long term liabilities are analyzed as before, and changes in current accounts except cash are also analyzed.
- The change in cash can be computed by analyzing change that occurred in all non-current and current accounts except cash.
- The major source of cash for a business is cash from trading operations.
- A cash flow statement is a vital analytical tool in the hand of financial manager that helps him in the proper management of cash.
- A comparative analysis of the firm's cash flow statements enables a financial manager to assess the liquidity position of the firm.

- A careful study of cash flow statement provides answer to some typical questions like why cash position of the concern is tight, in spite of high incomes or vice-versa.

NOTES

5.6 KEY WORDS

- **Cash flow statement:** It is a statement which provides a detailed explanation for the change in a firm's cash during a particular period by indicating the firm's sources and uses of cash during that period.
- **Cash inflow:** It refers to a business transaction that generates cash.
- **Cash outflow**: It refers to a business transaction that utilizes cash.
- **Mercantile system of accounting:** Also known as accrual system, under this system, the transactions (revenues and expenditures) are recorded when they occur or take place rather than when the actual cash are exchanged.

5.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. What is "Cash Flow"? Discuss the objectives of cash flow analysis.
2. State the difference between funds flow and cash flow statement.
3. Explain the procedure of preparing a cash flow statement.
4. Mention the major sources and application of cash with examples.
5. What is the utility of preparing cash flow statement?

Long-Answer Questions

1. Write short notes on:
   (a) Notional cash and
   (b) Non-cash items.
2. Discuss the procedures of ascertaining cash from operation as required for the preparation of a cash flow statement.
3. Following are the comparative balance sheets of IQRA Ltd.

Liabilities	*2011 (₹)*	*2012 (₹)*	*Assets*	*2011 (₹)*	*2012 (₹)*
Share capital	1,80,000	1,90,000	Cash	60,000	40,000
Sundry creditors	64,000	76,000	Sundry debtors	1,55,000	1,90,000
Profit and loss A/c	29,000	35,600	Land and building	50,000	62,000
			Patent rights	8,000	9,000
	2,73,000	3,01,000		2,73,000	3,01,000

Prepare a Cash Flow Statement.

4. Super Max Co. Ltd. wants to prepare a 'Cash Flow' statement for the year ended December 31, 2012, from the details given below:

(a) Income statement for the year ended 31-12-2012

Sales	29,000
Cost of sales	19,900
Tax provision	2,500
Dividend provided	1,600

(b) Balance Sheets

Liabilities	*2011 (₹)*	*2012 (₹)*	*Assets*	*2011 (₹)*	*2012 (₹)*
Capital	8,000	8,000	Fixed assets (Gross)	12,000	18,500
Reserves and supplies	6,000	11,000	Depreciation	(3,500)	(5,500)
Bank loan (long-term)	4,000	6,000	Inventory	8,000	7,000
Current liabilities	3,000	5,200	Accounts receivable	4,000	6,800
Dividend provided	–	1,600	Cash	500	5,000
	21,000	31,800		21,000	31,800

5. Following are the balance sheets of Super & Superior Company Ltd.

Liabilities	*Dec. 2011 (₹)*	*Dec. 2012 (₹)*	*Assets*	*Dec. 2011 (₹)*	*Dec. 2012 (₹)*
Share capital	70,000	74,000	Land	20,000	30,000
6% Debentures	12,000	6,000	Goodwill	10,000	5,000
Bills payable	10,000	11,000	Stock	49,200	42,700
Sundry creditors	1,060	1,640	Debtors	14,900	17,700
Profit and loss A/c	10,040	10,560	Cash	9,000	7,800
	1,03,100	1,03,200		1,03,100	1,03,200

Additional Information:

(i) Dividends were paid totalling ₹ 3,500.

(ii) Land was purchased for ₹ 10,000 and amount provided for the amortization of goodwill totalled ₹ 6,000.

(iii) Debentures loan was repaid ₹ 6,000.

You are required to prepare cash flow statement.

6. From the following balance sheets of Sweety Limited as on December 31, 2011 and 2012, you are required to prepare cash flow statement for the year ended December 31, 2012.

NOTES

Liabilities	*2011 (₹)*	*2012 (₹)*	*Assets*	*2011 (₹)*	*2012 (₹)*
Share capital	2,00,000	2,00,000	Machinery	87,000	86,000
Profit and loss	30,000	31,000	Building	52,000	48,000
Sundry creditors	8,000	5,400	Investment	78,000	80,000
Bills payable	1,200	800	Stock	30,000	23,400
Provision for taxation	16,000	18,000	Bills receivable	2,000	3,200
Provision for doubtful debts	400	600	Cash at bank	6,600	15,200
	2,55,600	2,55,800		2,55,600	2,55,800

Additional Information:

(i) Depreciation charged to plant ₹ 4,000. (ii) Provision for taxation of ₹ 19,000 was made during 2012.

7. From the following information you are required to prepare a cash flow statement of HMT Ltd. for the year ended 31-12-2012.

Balance Sheet **(*in* ₹ *000's*)**

Liabilities	*2011*	*2012*	*Assets*	*2011*	*2012*
Share capital	70	70	Plant	50	41
Secured loan (repayable 2018)	–	40	Inventory	15	40
Creditors	14	39	Debtors	5	20
Tax payable	1	3	Cash	20	7
Profit and loss A/c	7	10	Prepaid general expenses	2	4
	92	162		92	162

Profit and Loss Account

for the year ended 31-12-2012

Particulars	*(₹)*	*Particulars*	*(₹)*
To Opening inventory	15	By Closing inventory	40
To Purchases	98	By Sales	100
To Gross profit	27		
	140		140
To General exp.	11	By Gross profit b/d	27
To Depreciation	8		
To Taxes	4		
To Net profit c/d	4		
	27		27
To Dividend	1	By Balance b/d	7
To Balance c/d	10	By Net profit b/f	4
	11		11

NOTES

5.8 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 6 BUDGET AND BUDGETARY CONTROL

Structure

6.0 Introduction
6.1 Objectives
6.2 Budget and Budgetary Control: Meaning
  6.2.1 Advantages and Limitations of Budgetary Control
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6.0 INTRODUCTION

Budgetary control plays a significant role in sustaining the efficiency of a firm as it helps it to achieve its goals at a minimum cost. Budgetary control as an effective management tool for planning and coordinating various business activities helps executives to anticipate the influence and impact of a given set of events on the firms' business and their resources. To serve as an effective tool for managerial control, budgetary control at the same time provides a proper yardstick for the evaluation of actual performance. Some authors believe that budgets serve more effectively as a planning tool than a controlling device. However, firms need to bring flexibility in their budgets to make them work as a control device. In fact, budgets help organizations to attain their objectives by providing the feedback necessary for making changes in the plans in a changing business environment.

6.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of Budget
- Discuss the meaning and advantages of Budgetary control
- Describe the preparation of sales, production, production cost, purchase, overhead cost, cash and flexible budgets

6.2 BUDGET AND BUDGETARY CONTROL: MEANING

NOTES

Budget is generally recognized as a plan of action to be pursued by an organization during a defined period of time in order to achieve its objectives. It is a statement of anticipated results expressed either in financial or non-financial terms. According to Williamson (2003) *A budget is a formal plan of action expressed in monetary and other quantitative terms*. Gordon and Shillinglow (1974) state, *Budget is a pre-determined detailed plan of action developed and distributed as a guide to current operations and as a partial basis for the subsequent evaluation of performance*.

CIMA (1991) defines *A budget is a financial or quantitative statement prepared prior to a definite period of time of the policy to be pursued during that for the purpose of attaining a given objective*.

Sizer (1979) explains *Budgets are financial and/or quantitative statements prepared and approved prior to a defined period of time of the policy to be pursued during that period for the purpose of attaining given objective*.

To the author of this book, *a budget is a detailed schedule of the proposed combinations of the various factors of production which the management deems to be the most profitable for the defined period. It may be a forecast of sales, production costs, distribution costs, and administrative and financial expenses–and, therefore, of profit or loss*. It serves as a road map for executives and makes them aware when the company is straying from its planned route.

Concept Of Budgetary Control

Commercial organizations always aim to attain the highest volume of sales at the minimum cost in order to maximize their profits. To attain this objective, organizations need to realize that planning and control of activities become essential absolutely. It is, in fact, the system of budgetary control that provides the organizations with the framework which helps them to achieve this objective.

Budgetary control is a systematic process designed to plan and control the major activities of a firm's business through budgets prepared in advance with an objective to ensure effective use of resources. In the words of Batty (1978), *Budgetary control is a system which uses budgets as a means of planning and controlling all aspects of producing and/or selling commodities or services*. According to Scott (1970), *it is the system of management control and accounting in which all operations are precasted and so far as possible planned ahead and the actual results compared with the forecasted and planned ones*.

CIMA (1991) defines budgetary control as, the establishment of budgets relating to the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy or to provide a basis for its revision.

In the opinion of Brown and Howard (1975), *Budgetary control is a system of controlling costs which includes the preparation of budgets, coordinating the departments and establishing responsibilities, comparing actual performance with the budgeted and acting upon results to achieve maximum profitability*.

To the author of this book, *budgetary control is a process of managing an organization in accordance with an approved budget in order to keep total expenditure within authorized limits. It is designed to assist the management in deciding the future course of action and to develop the basis for evaluating the efficiency of operations*. Thus, a budgetary control consists of:

- Preparation of budgets for major activities of the business;
- Measurement and comparison of actual results with budgeted targets;
- Computation of deviation, if any; and
- Revision of budget, if required.

Thus, budgetary control requires preparation and designing of the budgets revealing clearly the financial responsibilities of executives in relation to the requirements of the overall policy of the company followed by a continuous comparison of actual business results with budgeted results to secure the objectives of the policy. If the principles of budgeting are carried out in a proper manner, the company can be assured that it will efficiently use all of its resources and achieve the most favourable results possible in the long run.

Objectives of Budgetary Control

The main objectives of budgetary control are as under:

- To provide useful, accurate and reliable information to enable managers formulate future business policies
- To help the organizations in exercising control over costs by preparing separate budgets for each department To evaluate the results of various policies and facilitate supervision over the various factors of production
- To eliminate the danger of over capitalization and under capitalization by determining the total capital requirements of a business firm with the help of production budget and working capital estimates
- To locate deficiencies in production system by preparing separate production capable of ascertaining the efficiency of production

- To promote research and development activities of an organization as budgetary control policies and programmes are usually based on past experience

6.2.1 Advantages and Limitations of Budgetary Control

Budgetary control is perhaps the most useful tool used by the management for planning and controlling major activities of the business. However, the system of budgetary control in itself does not ensure good planning or control but it helps executives to plan ahead and exercise control over people and operating events. In fact, such a system not only provides information on probable future business results but also the resources like money, men, materials and facilities required to achieve such results. The most notable benefits derived from the system of budgetary control are as follows:

- Through its disciplined approach, it coordinates the planning of all functional executives towards the common profit making goal.
- Motivates executives to think ahead by impressing upon them to formalize their planning efforts.
- Provides managers an opportunity for self-evaluation by offering them goals and objectives against which they can evaluate their performance without any difficulty. Such an arrangement makes each member of the organization clear about his role and contribution in attaining organizational goals.
- Enables an organization to predetermine the benefits and costs of the projects under various alternative operating conditions. Such a comparative analysis helps it to evaluate the most appropriate allocation of resources.
- Provides a framework that specifies measurable periodic objectives for each phase of planning.
- Helps managers to identify expected operation problems from business activities but also provides them the basis for solving these problems or avoiding them before they occur.
- Make employees of the organization conscious of the needs to conserve business resources.
- Maximize benefits of decentralization.
- Makes it obligatory for the enterprise to maintain adequate financial records that can be associated with the budget.
- Serves as an excellent vehicle and effective communication system for the exchange of ideas and coordination of plans among various levels of management.
- Reveals budgets prepared for efficient and effective use of resources.

- Increases participation of employees in the preparation and execution of budgets thereby boosting the morale among them which in turn contributes to the output.
- Helps a company meet market competition efficiently by keeping the cost at the minimum level.

Limitations of Budgetary Control

Despite the benefits mentioned earlier, budgetary control suffers from serious limitations. Management must keep such limitations in mind while using the tool of budgetary control. The major limitations of budgetary control system are summarized below:

- Since budget estimates are based on approximations and personal judgements, therefore, they are always doubtful. In fact, the quality of budgets is always associated with the intelligence, skills and experience of the budget persons.
- The premises of the budgetary control system change rapidly with the change in business conditions. As a result, business executives face a lot of difficulties in the execution of budgets.
- The success of budgetary control largely depends on its execution which in turn depends on the cooperation and participation of all levels of management. Every member of the organization must direct his efforts to achieve the objectives of the budget. Any lapse in their coordination or cooperation may result in poor performance.
- The installation of budgetary control system is a costly affair, and therefore, small organizations may not afford it. Even financially sound enterprises must adopt this system only after analysing properly its cost and benefits.
- Budget targets sometimes are considered as pressure tactics which lower the morale of the employees.
- The formulation of the budgets is a time-consuming process as a good amount of time is wasted in their preparation, evaluation and revision.
- There is an old saying to the effect that 'a man is usually down or what he isn't upon'. Often executives do not realize the utility of the budgetary control system.
- Under budgetary control system every budget centre tries to achieve its objectives without taking into consideration the objectives of other budget centres and overall objectives of the budgetary control system. This creates conflict among various units of the organization which ultimately interrupts the efficiency of the system.

6.2.2 Essential Characteristics of a Good Budgetary Control

A good budgetary control must possess the following characteristics:

- There must be a common authority to enjoy the rights and privileges as well as to fulfil the obligation. Actual users must be consulted before actually allocating different resources.
- The supervisory staff must be held responsible for all the functions of the business and proper utilization of all the resources of the business.
- Independence of action must be ensured for the administration in those matters for which they are accountable. In such matters, they must be consulted and their views should be given due weightage.
- One who gives orders must also provide facilities for the execution of those orders.
- There must be test checking of the work at regular intervals and the results must be compared with the targets. Shortcomings must be ascertained and measures should be suggested to overcome them.
- There must be some system for rewarding better results and penalizing poor results. Incentives for better work must be provided. Inefficiency must not be condoned.

Requirements for Budgetary Control

The prerequisites for good budgetary control are essentially the same as for sound business management. For effective budgetary control, the firms need to:

- develop the statement of objectives and policies to guide management in reaching its business goals;
- build up a sound plan for the organization with clearly defined responsibilities and authorities for each management and supervisory position;
- establish a clear understanding of cost behaviour and product cost structure;
- develop a plan of operations over a given period of time to achieve objectives efficiently and effectively;
- provide for measurement of performance through timely comparative control reports;
- take necessary action in the execution of plans to set right unsatisfactory performance;
- revise the budgets when required.

The concept of budgetary control formalizes the process implied in these requirements by incorporating the above steps into a comprehensive financial plan or budget. It should be obvious that the financial plan or budget is not just a forecast or a summary of the business results a year ahead. It is instead a plan of operation. The plan must be based on good operating practices and soundly conceived management strategy. It should have a certain extent of flexibility, a 'stretch' in it. This means that operating men should incorporate in the budget performance, goals that are attainable by hard work and dedicated effort. An easy test of whether or not a business budget has been built on good planning and control concept is to check these points:

- Sales and production requirements should be defined in terms of quantities by products.
- The variable and total costs of producing each product should be identified on a predetermined basis in the budget.
- Budgeted costs and expenses should be stated for each responsibility centre.
- The degree of capacity utilization of major equipments and facilities should be clearly defined in the budget plan.
- All departmental budgets should be based on the same volumes of product and service requirements and should meet an acceptable profit goal.

If an organization's budgetary control system does not meet these tests, functional executive need to discuss the lapses with the budget personnel to seek improvements in the system.

Check Your Progress

1. How does budgetary control eliminate the danger of over capitalization and under capitalization?
2. Why is it said that budgetary control system may ultimately interrupt the efficiency of the system?

6.3 CLASSIFICATION AND PREPARATION OF BUDGETS

Different authorities have given different classifications of budgets. Some classify them on the basis of functions involved, period covered, nature of transactions while others classify them according to activity levels. Accordingly, the following classifications are given:

Budgets according to activity levels:

- Fixed budget
- Flexible budget

NOTES

Classification on the basis of nature of transactions:

- Operating budget
- Capital budget

Period classification:

- Long-term budget
- Short-term budget

Functional classification:

- Master budget
- Subsidiary budget

However, classification on the basis of functions is more popular and common almost in every business concern.

Fixed Budget

Although this approach to budgeting is not popular among the firms yet a few firms do use fixed budget in certain areas of expenses management. Generally fixed budget is referred to as predetermined costs projected at a particular capacity level. That is, once capacity is projected at a particular level, the individual department gathers and classifies their costs at that level. The budget thus prepared is known as a fixed budget. Such budgets assume that the amount of rupees shown in the budget is triggered by the passage of time irrespective of production levels or the volume of activity. The CIMA (1991) defined fixed budget as a budget which is designed to remain unchanged irrespective of the level of activity actually attained. In the words of Wilson (1975) *a fixed budget is one that is compiled for a given set of assumed operating conditions and for a clearly specified but estimated level of activity, and which management proposes to leave unchanged during the period to which it relates—regardless of changes in the actual level of activity experienced or in the conditions facing the company during that period*. Thus, fixed budget is a plan that expresses only one level of estimated activity or volume. Such a budget is also known as static budget. The term 'fixed budget' is probably a misnomer because this budget really is never fixed. Business and economic conditions constantly change and the management has to review and change the budgets in the light of those changes.

Flexible Budget

Firms that recognize the tendency of fixed overhead to vary with substantial changes in production prefer to use a flexible budget. This is simply a series of fixed budgets that apply to varying levels of production. According to CIMA (1991), a flexible budget is *a budget which, by recognizing the difference between fixed, semi-fixed and variable costs, is designed to change in relation to the level of activity attained.* Thus, a flexible budget is a series

of cost budgets, each prepared for a different level of capacity. The capacity levels are set at percentages of capacity or at the production of a specified number of units at set levels of capacity. In fact, costs are broken down into fixed, variable, and semi-variable under various levels of capacity. Although flexible budgets generally do not distinguish between variable and fixed overhead yet they provide a single rate for both types of overheads. This rate is established by dividing estimated overhead at the normal production level by the normal volume of production.

Flexible budgeting can be incorporated in one of two ways—*step budget*, wherein budgets are developed for different levels of operation, or *variable budget*, where budgets are prepared on a variable cost basis providing progressively greater budget allowances as the volume of activity increases. Business executives prefer the technique of flexible budgeting as it can be easily understood by the supervisors at all levels and with all degrees of education because of the realistic way in which such budgets accommodate actual operating conditions in the plant. The major significance of flexible budgeting is that it provides completely realistic budget amounts. There are very less chances for variances, which too can be the result of inefficient control or changes in operating conditions.

Illustration 6.1: The cost details obtained from financial records of Safa Ltd., for production of 500 units are given below:

Particulars	*Per Unit* (₹)
Material	40
Labour	30
Variable overhead	12
Selling and distribution expenses (20 per cent fixed)	10
Administrative expenses (40 per cent variable)	15
Fixed overheads (₹ 7,500)	15
Selling cost per unit	122

You are required to prepare a budget for production of:

(i) 700 units; and (ii) 900 units.

Solution

Safa Ltd.
Flexible Budget

	OUTPUT					
	500 Units		*700 Units*		*900 Units*	
	Per Unit	*Amount (₹)*	*Per Unit*	*Amount (₹)*	*Per Unit*	*Amount (₹)*
Material	40	20,000	10	28,000	40	36,000
Labour	30	15,000	30	21,000	30	27,000
Variable overhead	12	6,000	12	8,400	12	10,800
Selling & distribution						

Expenses:						
Fixed (20 per cent)	2	1,000	1.43	1,000	1.11	1,000
Variable (80 per cent)	8	4,000	8	5,600	8	7,200
Administrative Expenses:						
Fixed (60 per cent)	9	4,500	6.43	4,500	5	4,500
Variable (40 per cent)	6	3,000	6	4,200	6	5,400
Fixed overhead	15	7,500	10.71	7,500	8.33	7,500
Total Cost of Sales	122	61,000	114.5	80,000	110.44	99,400

Operating Budget

The operating budget is a plan of the expected revenues and expenses from normal operations and activities to be carried out by the organization in the future. Such a budget contains a detailed programme of activities that a firm desires to perform during the budget period which normally consists of one year. The profit and loss items like sales, production, distribution expenses and administrative overheads are also projected in this budget. In fact, the budget often states such performance measures which are not apparently seen in the financial statements. The best examples of operating budgets are raw material budget, inventory budget, labour force budget, and so on The nature and scope of various types of operating budgets are discussed in a later section of this unit.

Capital Budget

Capital budget is a plan reflecting the investments of the business in fixed assets and often includes amounts for large expenditure that have a long-term impact on the firm's financial position and growth. The activities that fall within the scope of capital budget mainly consists of programmes on infrastructure development, output expansion, and increase in productive resources. Since the outlay of capital budget is normally higher as compared to operating budget, they require careful planning, analysis and evaluation. Such budgets, in fact, aim to contribute maximum to the organizational goals and objectives.

Short-term Budget

Short-term budgets refer to such budgets which cover activities of the business for a period of a year or shorter. Generally, firms prefer to prepare such budgets for sales and cash overheads. However, such budgets can be broken down to shorter periods of 6 months, 3 months and possibly even one month. Experts generally believe that managers enjoy more flexibility by breaking down the period of budget in shorter periods. Normally, departmental executives are responsible for the preparation of short-term budgets. Various departments of the enterprise need to work in coordination for the preparation of short-term budgets as the top-level management coordinates the final budget on the basis of short-term budgets.

Long-term Budget

To meet the demands of growing business and competition, firms need to move beyond the short-range plan to look ahead for more than one year. Long-term budgets may cover periods of one, three, five and even more years depending upon the nature of the business. According to the National Association of Accountants, America, a long-term budget is *a systematic and formalized process for purposeful directing and controlling future operations towards a desired objective for periods extending beyond one year*. The responsibility for the preparation of long-term budgets generally rests with top-level management. The top-level management is generally responsible for strategic decisions concerned with growth and prosperity of business. Since the preparation of such a budget demands the study of both internal factors as well as external factors like industry competition, economic growth, social and cultural change, and technological development, it calls for strategic capabilities on the part of management.

Master Budget

The master budget sets out a firm's plan for the operations and resources expressed in financial terms for a given period. It is a summary of the budget schedules in capsule form made for the purpose of presenting in one report the highlights of the budget period. The CIMA (1991), defines it as, *The summary budget, incorporating its component functional budgets which is finally approved, adopted and employed*.

Davidson and others state, *The master budget, sometimes called the comprehensive budget is a complete blueprint of the planned operations of the firm for a period*.

Thus, the master budget is an overall budget of a firm which includes all other small departmental budgets. It is network consisting of many separate budgets that are interdependent. In fact, the master budget contains consolidated summary of all the budgets prepared by the organization. Such a budget coordinates various activities of the business, directing them towards a common goal. Few top executives of the business are supplied with copies of master budgets. Such a budget is of no use to departmental executives. It draws the attention of the management to those issues which must require immediate attention or which must be avoided without any delays in the interest of the business.

Preparation of a Master Budget: It is a complex process that requires much time and effort by the management at all levels. It includes the preparation of a projected profit and loss account (income statement) and projected balance sheet. The preparation of master budget involves the preparation of:

- sales budget;
- production cost budget;

- cost budget;
- cash budget;
- projected profit and loss account on the basis of information collected from the above stated four steps; and
- projected balance sheet from the information available in last year's balance sheet and with the help of the steps stated above.

The format of the master budget is given in Tables 6.1 and 6.2.

Table 6.1
.... Co. Ltd.,
Master Budget
(*For the year ending as on . . . .*)
Projected Profit and Loss Account for the Year Ending . . . .

Particulars		*Previous Period Amount (₹)*	*Budgeted Period Amount (₹)*	*Particulars*	*Previous Period Amount (₹)*	*Budgeted Period Amount (₹)*
To cost of product (as per production cost budget)				By sales (as per sales budget)		
Direct material	₹			(a) x product ... units @ ₹.....		xxx
(......Units@ ₹...)	xxx					
Direct wages	xxx			(b) x product...... units @ ₹		xxx
Prime cost			xxx			
Factory overheads						
(a) Variable	xxx					
(b) Fixed	xxx		xxx			
Work cost			xxx			
Administrative, selling and distribution overheads			xxx			
To Net Profit			xxx			
			xxx			xxx

Table 6.2
Budgeted Balance Sheet

Liabilities	*Previous Period Amount (₹)*	*Budgeted Period Amount (₹)*	*Assets*	*Previous Period Amount (₹)*	*Budgeted Period Amount (₹)*
Shareholder's Equity:			*Fixed Assets:*		
Pref. share capital			Plant & Machinery		
Equity share capital			Building		
			Furniture		
Current Liabilities:			*Current Assets*:		
Bill payable			Bill Receivable		
Sundry creditors			Sundry debtors		
Bank loan			Cash in hand and at bank		
			Inventories		

Subsidiary Budget

Subsidiary budgets are those budgets which show income or expenditure appropriate to or the responsibility of a particular activity of the business. They are prepared on the basis of the guidelines framed by the master budget. There may be different kinds of subsidiary budgets depending on the size, nature and policy of the concern but the following are frequently prepared:

- sales budget
- production budget
- production cost budget
- materials budget
- labour budget
- manufacturing overhead budget
- expenses budget
- plant budget
- cash budget.

6.3.1 Sales Budget

It is an estimate of future sales expressed in quantities and/or money. Such a budget, in fact, calls for projection of a firm's sales on a periodic basis. The preparation of an effective sales budget demands the study of both internal and external factors. The internal factors to be considered for the purpose are past activity, present and projected plant capacity, proposed management policies, financial position, sales force size, availability of materials, and promotional campaign. The external factors that must be analysed to enable managers prepare sales budget include extent of competition, government policies and regulations, economic conditions of the country and general trade prospectus. The management should constantly review the above-mentioned factors in order to find out the quantum of change in them and its impact on product demand.

Generally, sales budget is recognized as the key budget that leads to the preparation of all other functional budgets. The success of any commercial enterprise largely depends upon the quick turnover of its production. Against this background, every company wants to maximize its sales. However, the maximization of sales has always remained a complex problem that requires proper attention from the management. Every effort must be made to achieve sales targets. The sales budget can be broken down by:

- product lines
- geographic territories
- time span
- types of customers.

NOTES

A forecast of sales on an industry-wide basis must be broken down so that it applies to a particular firm. Each firm studies its position relative to the total market and calculates its share of the market. In some areas and in certain product lines, one firm may dominate while in other areas and in other product lines, the sales may be shared by the firms in different proportions. The following techniques are used for sales forecasts:

- past trends
- sales executives opinion
- survey methods

The following illustration will further clear the idea about the preparation of sales budget.

Illustration 6.2: MAS Co. Ltd. operates two sales divisions by selling two quality cement products—White and Black in them. For the purpose of submission of sales budget to the budget committee, the following information has been made available.

Budget sales for the current year were as follows:

Product	*Division I*	*Division II*
White	800 at ₹ 100	600 at ₹ 100
Black	400 at ₹ 80	500 at ₹ 80

Actual sales for the current year were as follows:

Product	*Division I*	*Division II*
White	1,000 at ₹ 100	700 at ₹ 100
Black	600 at ₹ 80	450 at ₹ 80

The sales division of the company has taken the following decisions at a meeting:

(i) The sales manager observed that product White is popular but underpriced. Therefore, the price of product should be increased by ₹ 20.

(ii) The product Black has less market and the main reason responsible for it is the over price of the product. However, if the price of the product is reduced by ₹ 5, it is expected to generate more demand.

On the basis of these price changes and reports from the sales force, the following estimates have been prepared by divisional sales manager:

Percentage increase in sales over current budget.

Product	*Division I*	*Division II*
White	5	20
Black	10	10

You are required to prepare a sales budget to be presented to the budget committee.

NOTES

Solution

Sales Budget
MAS Co. Ltd.

Division	*Product*	*Budget for Future Period*			*Budget for Current Period*			*Actual Sales for Current Period*		
		Qty.	*Price (₹)*	*Value (₹)*	*Qty.*	*Price (₹)*	*Value (₹)*	*Qty.*	*Price (₹)*	*Value (₹)*
I.	White	840	120	1,00,800	800	100	80,000	1,000	100	1,00,000
	Black	440	75	33,000	400	80	32,000	600	80	48,000
	Total	1,280		1,33,800	1,200		1,12,000	1,600		1,48,000
II.	White	720	120	86,400	600	100	60,000	700	100	70,000
	Black	550	75	41,250	500	80	40,000	450	80	36,000
	Total	1,270		1,27,650	1,100		1,00,000	1,150		1,06,000
Total	White	1,560	120	1,87,200	1,400	100	1,40,000	1,700	100	1,70,000
	Black	990	75	74,250	900	80	72,000	1,050	80	84,000
	Total	2,550		2,61,450	2,300		2,12,000	2,750		2,54,000

Illustration 6.3: Super National Company Ltd. has three items in its product line—EX, YEE and ZED. These products are sold in two markets—Super and Superior. The following information on the sales of these products in these markets is available:

Product Units	*Budget Sales for Current Year*		*Actual Sale of Current Year*	
	Super Market (Unit)	*Superior Market (Units)*	*Super Market (Unit)*	*Superior Market (Units)*
EX	18,000	22,000	20,000	25,000
YEE	9,000	12,000	7,000	10,000
ZED	15,000	8,000	12,000	7,000

The EX product is sold at ₹ 5 per unit whereas products YEE and ZED are sold for ₹ 4 and ₹ 7 respectively, in both markets.

The research department of the company submitted the following proposals to be kept in mind while preparing sales budget:

(a) Product EX has stiff competition in future and as a result of which the sales may decline. To maintain present state of demand the price of the product may be reduced by 10 per cent.

(b) Product YEE is popular but underpriced. It is reported that if its price is increased by 25 per cent it will still find a ready market.

(c) The sale of product ZED may decline by 10 per cent due to entrance of new firms in the industry.

(d) With the help of an intensive campaign 5 per cent additional sales over the estimated sales are expected in all products in both markets except of product ZED in superior market.

The management has approved the proposal without any change. You are required to prepare a budget for sales incorporating the above proposals.

Solution

Sales Budget
Super National Company Ltd.

Market and Product	*Budget for Future Period*			*Budget for Current Period*			*Budget for Current Period*		
	Qty. (Units)	*Price (₹)*	*Value (₹)*	*Qty. (Units)*	*Price (₹)*	*Value (₹)*	*Qty. (Units)*	*Price (₹)*	*Value (₹)*
Super									
EX	18,900	4.50	85,050	18,000	5.00	90,000	20,000	5.00	1,00,000
YEE	9,450	5.00	47,250	9,000	4.00	36,000	7,000	4.00	28,000
ZED	14,250	7.00	99,750	15,000	7.00	1,05,000	12,000	7.00	84,000
Total	42,600		2,32,050	42,000		2,31,000	39,000		2,12,000
Superior									
EX	23,100	4.50	1,.03,950	22,000	5.00	1,10,000	25,000	5.00	1,25,000
YEE	12,600	5.00	63,000	12,000	4.00	48,000	10,000	4.00	40,000
ZED	7,600	7.00	53,200	8,000	7.00	56,000	7,000	7.00	49,000
Total	43,300		2,20,150	42,000		2,14,000	42,000		2,14,000
Total (Summary)									
EX	42,000	4.50	1,89,000	40,000	5.00	2,00,000	45,000	5.00	2,25,000
YEE	22,050	5.00	1,10,250	21,000	4.00	84,000	17,000	4.00	68,000
ZED	21,850	7.00	1,52,950	23,000	7.00	1,61,000	19,000	7.00	1,33,000
Total	85,900		4,52,200	84,000		4,45,000	81,000		4,26,000

NOTES

6.3.2 Production Budget

After the preparation of sales budget, the management turns its attention to the preparation and designing of a production budget. Production budget is a component of the master budget that establishes the level of production planned for budget period. It fixes the target for the future output. In a broader sense, production budget attempts to estimate the number of units of an item of the product line that a company is planning to produce during the budgeted period. Sufficient amount of goods will have to be available to meet sales needs of the budgeted period and the quantity of inventory needed at the end of the period. A portion of these goods will already exist in the form of an opening inventory. The remainder will have to be produced. The quantity to be produced is decided after taking into consideration the following:

- Opening and closing levels of inventories; and
- Quantity required to meet projected sales.

Further, a budget executive has also to analyse the factors mentioned below to enable himself prepare the production budget:

- Maximum production capacity of the business;
- Production planning of the organization;
- Managing policy regarding produce or purchase of components;
- Available storage facilities; and
- Amount of investment required.

The production department must schedule its production in such a way so as to ensure prompt deliveries to the customers. To achieve this objective, the sales department must be closely coordinated with the production department. Neither department can plan and direct its activities in isolation. The department of sales has to depend on production from the production department and at the same time, the production department guides its production levels on the basis of sales estimates as submitted by the sales department.

A format of a detailed production budget is given as under:

.... Co. Ltd.
Production Budget
January, February and March 20xx

Particulars	*January*	*February*	*March*
Sales in quantity (as per sales budget)	xxx	xxx	xxx
Add: Desired inventory at the end	xxx	xxx	xxx
Total quantity required	xxx	xxx	xxx
Less: Stock at beginning	xxx	xxx	xxx
Quantity to be produced	xxx	xxx	xxx

Illustration 6.4: From the following information prepare a production budget for 3 months of NICE Cement Co. Ltd.

(i) The estimated sales for the budget period as reported by sales manager are:

Division	*Types of Products*			
	White (Tonnes)	*Black (Tonnes)*	*Red (Tonnes)*	*Green (Tonnes)*
North	7,000	12,000	16,000	10,000
South	5,000	8,000	10,000	3,000

(ii) Estimated stock on June 1, 2012

Type of Product	*Tonnes*
White	1,200
Black	1,500
Red	1,800
Green	1,200

(iii) Desired closing stock on 31st August, 2012

Type of Product	*Tonnes*
White	1,500
Black	1,800
Red	1,400
Green	1,000

Solution

Production Budget for Three Months from June to August, 2012

Estimated Sales During Budget Period	*Types of Products*			
	White (Tonnes)	*Black (Tonnes)*	*Red (Tonnes)*	*Green (Tonnes)*
North	7,000	12,000	16,000	10,000
South	5,000	8,000	10,000	3,000
Total	12,000	20,000	26,000	13,000
Add: Desired stock on 31st August, 2012 (closing stock)	1,500	1,800	1,400	1,000
	13,500	21,800	27,400	14,000
Less: Estimated stock on June 1st, 2012 (opening stock)	1,200	1,500	1,800	1,200
Quantity to be produced	12,300	20,300	25,600	12,800

6.3.3 Production Cost Purchase and Overheads Budget

It is followed by production cost budget that includes the summaries of direct material budget, direct labour budget and manufacturing overhead budget. Each of these budgets must consider the quantities to be produced as reflected in the production budget and the prices of the factors which a firm expects to prevail during the budget period.

Materials Budget: It is prepared with a view to ensure regular supply of the required quantity of raw materials as per the production schedules. A schedule of materials requirement is prepared indicating the unit quantities of each material required per unit of finished product. A firm multiplies the raw material requirements per unit of product by the projected production of each product which gives it the total production requirements.

The quantity of material so calculated must be increased by some pre-determined percentage to allow for waste and spoilage. The quantity of material required for production and the required inventory level will yield the quantities of each material which will have to be available during the budget period. The available quantity of material estimated should be deducted by the inventories of raw material at the beginning of the budget period; the resultant material quantity is the quantity of material to be purchased during the budget period.

The estimation of material requirements is the responsibility of the production engineering department while the estimation of price at which the raw material could be procured from the market is the responsibility of the purchasing department. Materials budget helps the firms not only in keeping wastage of raw material under control but also in the determination of economic order quantity.

The format of detailed materials budget is given as under:

.... Co. Ltd.
Materials Budget
(*For the Year Ending ....*)

Particulars	*Units*
A. Quantity to be purchased	xxx
Units to be consumed (as per production budget)	
Add: Minimum ending inventory	xxx
Total raw material requirements	xxxx
Less: Stock at the beginning	xx
Purchase requirements	xxx
B. Cost involvement	(₹)
---------- units @ ₹ ...	xx
Carriage inwards	xx
Cost of purchases	xxxx

Illustration 6.5: Super Max manufactures two type of products—BEE and TEE. The sales department reports that 35,000 and 48,000 units of BEE and TEE respectively are sufficient to meet the estimated demand during the budget period.

The Engineering department submits the following report in respect of material requirements:

Product Type and Quantity of Material Required Per Unit

	Type	*Qty. (Units)*
BEE	TT	2
	PP	3
TEE	FM	4
	FT	2

Management had adopted the following policy in respect of inventories:

(a) Opening Balance

(i) Finished product

BEE 7,000 units

TEE 4,500 units

(ii) Raw materials

Material TT 20,000 units

Material PP 18,000 units

Material FM 15,000 units

Material FT 13,000 units

(b) Closing balances

(i) Finished product

BEE 10,000 units

TEE 7,000 units

(ii) Raw Materials

Material TT 7,000 units

Material PP 5,000 units

Material FM 3,000 units

Material FT 2,000 units

Draw up a material purchase budget.

Solution

Materials Budget

(for the Year Ending.......)

	Product BEE		*Product TEE*	
	Material TT (Units)	*Material PP (Units)*	*Material FM (Units)*	*Material FT (Units)*
Material required to produce 38,000 units of BEE product and 50,500 units of TEE product (A)	76,000	1,14,000	2,02,000	1,01,000
Add: Desired closing balance of material at the end of the year	7,000	5,000	3,000	2,000
	83,000	1,19,000	2,05,000	1,03,000
Less: Opening balance of material at the beginning of the year	20,000	18,000	15,000	13,000
Materials required to be purchased during the year	63,000	1,01,000	1,90,000	90,000

Working Notes:

(A) Calculation of production during the year:

Particulars	*BEE (Units)*	*TEE (Units)*
Estimated sales	35,000	48,000
Add: Desired closing stock of finished products	10,000	7,000
	45,000	55,000
Less: Opening stock of finished products	7,000	4,500
Quantity to be produced	38,000	50,500

Labour Budget: It is developed directly from the production budget. It indicates the quantity and cost of direct labour required to meet production needs. Labour budget discloses the requirement of the skilled as well as unskilled workers for carrying out the budget output. It fixes up the number and class of workers, their wages, incentives, training and other conditions of workers. To ensure effective planning, coordination and control of labour,

this budget has to provide sufficient details including the amount of each specific labour operation required to produce each product. This budget helps personnel department in designing appropriate hiring and training of qualified personnel. Thus, labour budget is essential not only for production planning but also for planning personnel resources.

The quantity of labour required to meet production needs can be estimated either from standards or from records of past performance. The simple way to compute the quantity of labour requirement is to divide the required number of units of finished products by the number of direct labour hours required to produce a single unit. For a labour mix, a separate calculation is to be made for each type of labour. The resultant is multiplied by the labour cost per hour as is shown in Illustration 17.6.

Illustration 6.6: The Great Ess Industries Ltd. manufactures three products—X, Y and Z. The enterprise has decided to produce 2,500, 4,000 and 7,000 units of X, Y and Z respectively for the month of March.

The estimated labour hours required to produce each unit are:

Product	*Labour Hours*
X	3
Y	4
Z	2

The cost per labour hour is estimated to ₹ 4

Draw up a labour budget showing (A) quantity and (B) cost of labour.

Solution

Great Ess Industries Ltd.
Labour Budget
for the Month of March

	Products		
	X	*Y*	*Z*
Estimated production (units)	2,500	4,000	7,000
Labour hour per unit	3	4	2
(A) Total labour hours required	7,500	16,000	14,000
Labour cost per hour	₹ 4	₹ 4	₹ 4
(B) Total labour cost	30,000	64,000	56,000

Manufacturing Overhead Budget: The manufacturing overhead budget is a schedule showing the expected amount of manufacturing cost that will be incurred for the budgeted level of activity. Manufacturing overheads consists of fixed, variable and semi-variable cost components. As discussed earlier, variable overhead costs change proportionately with the volume of production whereas fixed overhead costs remain constant irrespective of output. The semi-variable overhead costs also change with the output but not proportionately. Management has to use some equitable basis to apportion

the fixed overheads and the fixed elements of the semi-variable overheads to the various budget centres. Therefore, the preparation of the manufacturing overhead budget requires experience, knowledge, expertise and intelligence on the part of those preparing the budget.

Expenses Budget: Once the production plans have been designed, the overheads need to be determined to produce the products. Departmental managers ordinarily prepare their own budgets for indirect labour and overhead factors. Expenses budget consists of several sections, namely, factory overheads, administration expenses, and sales and distribution expenses. These budgets are prepared on the basis of figures of income statements of the previous years. A proper distinction of recurring and non-recurring is made while preparing these budgets.

The expenses budget format is given as under:

...... Co. Ltd.

Expenses budget (For the Year Ending ....)

	(₹)	(₹)
Factory overheads:		
Fuel and power	xxx	
Water	xxx	
Depreciation	xxx	
Supervisor's salary	xxx	xxxx
Administration expenses:		
Salaries	xxx	
Printing and stationery	xxx	
Rent and rates	xxx	
Lighting	xxx	
General expenses	xxx	xxxx
Sales and distribution expenses:		
Salesmen's salaries	xxx	
Salesmen's commission	xxx	
Advertising	xxx	
Entertainment and car expenses	xxx	
Shop display	xxx	
Display	xxx	xxxx
Total expenses		xxxx

Plant Budget: In large-scale industries where production is carried on with the help of costly machines, plant budget is prepared to ensure maximum utilization of available machines.

6.3.4 Cash Budget

The availability of cash in adequate quantity at proper time at a reasonable cost is essential for smooth operation of a business. The cash budget attempts to estimate cash requirements of a business well ahead of time. According to

Soloman, (1968) 'the cash budget is an analysis of flow of cash in a business over a future, short or long period of time. It is a forecast of expected cash intake and outlay'. The cash budget converts all planned actions into cash inflows and cash outflows. Thus, it shows the anticipated flow of cash and the timing of receipts and disbursements based upon projected revenues and expenses. This budget is significant because it helps management in planning to avoid unnecessary idle cash balances on the one hand and avoidable expensive borrowings on the other. It indicates not only the total amount of financing required but its timing as well. The cash budget generally consists of the following two major sections, viz., receipt section and payment section.

Normally, the major source of cash receipts for any business is sales. For credit sales, accounts receivable are eventually converted into cash as debtors pay their accounts. However, in this connection, management has to estimate properly the time taken to collect outstanding accounts. At the same time, provisions must be made for discounts, returns, allowance granted and uncollectible accounts. From a study of past records and recent experience in the rate of collection, it should be possible to predict approximate receipts on accounts.

Special items such as increase in cash from sale of equipment, issuance of shares, borrowing, and so on must be considered in the estimation of cash receipts. Thus, cash receipts are expected to be generated from the following sources:

- cash sales;
- collection from debtors,
- non-operating incomes like dividend, commission, interests, and so on,
- sale proceedings from capital assets;
- share capital and debentures; and
- loans and overdrafts.

The payment section of the cash budget consists of all cash payments that are planned for the budget period. These payments will include payments for merchandise and overhead acquired or incurred for the current budget period as well as for payables on the past budget period. Payments on various accounts are not made simultaneously with the cost incurred or materials and services used. The expenditure on various items like insurance, rent and advertising are often paid in advance while payments for materials, labour and other costs of operation frequently follow acquisition and use. Capital expenditures for expansion and replacement in addition to mandatory expenditures for a variety of other purposes such as taxes, donations, repayments of loans, dividends, and so on must be taken into account. The major items of payments are:

- payment for various inputs like materials, labour and machinery;
- payment of loans and deposits;
- redemption of capital and debentures; and
- investments.

The difference between cash receipts and payments represents *cash overage* or *shortage*. If a shortage exists, the company will have to arrange the cash through bank loans or other financing methods. If an excess exists, funds borrowed in previous period can be repaid, or the idle funds can be temporarily invested.

How frequently cash budget should be prepared and the time intervals covered by the budget depend on the individual company's circumstances, problems and objective. However, cash budget should be broken down into time periods that are as short as feasible. Many organizations maintain cash budgets on a weekly basis and even some prefer to do it on daily basis. But firms prefer to have case budgets on a monthly basis. However, a firm might be interested to prepare a cash budget every quarter if it is considering expansion.

Cash budgets may be prepared in three ways with varying formats and appearances. However, all forms require the same estimates and result in the same forecast. The methods are

- Receipt and payment method;
- Adjusted profit and loss method; and
- Balance sheet method.

Receipt and Payment Method: This method is a line-by-line estimate of receipts and payments. A good starting point for developing the cash budget is the opening cash balance to which expected cash receipts during the budget period are added. The figure so obtained is reduced by the amount of cash payment that is planned for the budget period. The outstanding payments and receipts are excluded from cash budget as this method is based on the concept of actual cash flows rather than on their accrual. Accordingly pre-payments and pre-receipts are to be considered in the preparation of cash budget. The receipt and payment method of cash budget is demonstrated in Illustration 6.7.

Illustration 6.7: Prepare a cash budget for the first four months from the following estimated revenue and expenses:

Month	*Sales* (₹)	*Purchase* (₹)	*Labour (Wages)* (₹)	*Overhead Administrative* (₹)	*Overhead Distribution* (₹)
April	60,000	60,000	12,000	2,000	1,200
May	66,000	42,000	14,000	2,200	1,400
June	72,000	40,000	16,000	2,200	1,400
July	78,000	36,000	18,000	2,400	1,600
August	84,000	34,000	20,000	2,600	1,600

NOTES

Additional Information:

(i) Cash balances on 1st April was ₹ 35,000.

(ii) 50 per cent of sales are on credit basis which are realised in the subsequent month.

(iii) Suppliers are paid in the month following the month of supply.

(iv) Delay in payment of wages and overheads is 30 days.

(v) Dividends on investments amounting ₹ 10,000 may be received in April and July.

(vi) Company plans to purchase a machine for ₹ 60,000 for which it has to pay the consideration in three equal instalments in the month of April, June and July.

Solution

Cash Budget

for the Period April to July

Details	*April* (₹)	*May* (₹)	*June* (₹)	*July* (₹)
A. *Balance b/d*	35,000	55,000	42,800	32,200
B. *Receipts:*				
Cash sales (50 per cent)	30,000	33,000	36,000	39,000
Debtors	—	30,000	33,000	36,000
Dividends	10,000	—	—	10,000
Total (A + B)	75,000	1,18,000	1,11,800	1,17,200
C. *Payments:*				
Creditors	—	60,000	42,000	40,000
Wages	—	12,000	14,000	16,000
Administrative overhead	—	2,000	2,200	2,200
Distribution overhead	—	1,200	1,400	1,400
Machine	20,000		20,000	20,000
Total C	20,000	75,200	79,600	79,600
Balance (A + B – C)	55,000	42,800	32,200	37,600

Adjusted Profit and Loss Method: Under this method, the profit forecast for the budget period is adjusted for non-cash transactions and for expected changes in assets and liabilities not involved in the calculation of profit. Thus, net estimated profit for the budget period is increased by the amount of no-cash transactions like depreciation, provisions, outstanding expenses, and so on, which in turn is added by capital receipts, reduction in assets and increase in liabilities to form total cash receipts. The amount so calculated is reduced by the amount resulting from payment of dividends, pre-payments, increase in assets and decrease in liabilities. The resultant figure will be the amount of cash available at the end of the budget period. The top management always prefers to use adjusted profit and loss for cash forecasting but most firms are compelled to use the line-by-line estimate to provide the detailed information needed by lower management levels for control. The essential information for

the preparation of adjusted profit and loss account is collected from profit and loss account and balance sheet. Illustration 6.8 will demonstrate the process of preparation of cash budget as per adjusted profit and loss account method.

NOTES

Illustration 6.8: The following data is made available to you to prepare a cash budget under the adjusted profit and loss method:

Balance Sheet

as on 31st March 2012

Liabilities	(₹)	*Assets*	(₹)
Share capital	2,00,000	Building	1,25,000
Debentures	75,000	Machinery	75,000
Reserves	35,000	Furniture & fixtures	55,000
Profit & loss a/c	20,000	Debtors	25,000
Creditors	60,000	Bills receivable	20,000
Bills payable	20,000	Closing stock	45,000
		Bank balances	65,000
	4,10,000		4,10,000

Projected Trading and Profit and Loss Account

for the Year Ending 31st March, 2013

Particulars	(₹)	*Particulars*	(₹)
To Opening stock	35,000	By Sales	4,20,000
To Purchases	2,20,000	By Closing stock	85,000
To Carriage	12,000		
To Gross profit c/d	2,38,000		
	5,05,000		5,05,000
To Establishment	1,00,000	By Gross Profit b/d	2,38,000
To Discount	12,000	By Commission	12,000
To Administrative Exp.	38,000	By Interest	10,000
To Distribution Exp.	22,000		
To Depreciation on machinery	16,000		
To Advertisement	18,000		
To Net profit c/d	54,000		
	2,60,000		2,60,000
To Dividends	22,000	By Balance of profit from last year	20,000
To Balance c/d	52,000	By Net profit b/d	54,000
	74,000		74,000

The following closing balance of certain items as on 31st March 2013 are also given as additional information:

Share capital	₹ 2,40,000
Debentures	₹ 90,000
Building	₹ 1,40,000
Machinery	₹ 80,000
Bills payable	₹ 25,000

NOTES

Solution

Cash Budget

	(₹)	(₹)
Cash balances as on 1st April, 2012		65,000
Additions to cash:		
Net profit of the year	54,000	
Depreciation	16,000	
Issue of share capital	40,000	
Issue of debentures	15,000	
Increase in B/P	5,000	1,30,000
Cash available		1,95,000
Deduction of cash:		
Dividends paid	22,000	
Purchase of buildings	15,000	
Purchase of machinery	5,000	
Increase in stock	40,000	82,000
Closing balance as on 31st March, 2013		1,13,000

Balance Sheet Method: Under this method the cash balances at the end is computed with the help of a projected balance sheet. The projected balance sheet begins with the current balance sheet and the same is adjusted in accordance with the data contained in the other budgets. All the balance sheet items except cash balances are adjusted in the light of changes that might take place between current balance sheet and the projected balance sheet. The difference between projected assets and projected liabilities represents cash balance.

Illustration 6.9: With the data given in Illustration 6.8 prepare the cash budget under the balance sheet method:

Solution

Budgeted Balance Sheet

as on 31st March, 2013

Liabilities	(₹)	*Assets*		(₹)
Share capital	2,40,000	Building		1,40,000
Debenture	90,000	Machinery	80,000	
Reserves	35,000	*Less:* Depreciation	16,000	64,000
Profit and loss A/c	52,000	Furniture and fixture		55,000
Creditors	60,000	Debtors		25,000
Bills payable	25,000	Bills Receivables		20,000
		Closing stock		85,000
		Bank balances (balancing figure)		1,13,000
	5,02,000			5,02,000

Illustration 6.10: Electra Electronics Co. Ltd. manufactures watches and calculators. The company engages two marketing channels—direct and indirect to dispose of its production. The following information has been made available to the Budget Committee in respect of company sales:

Budgeted sales for the current period were:

Channels	*Watches*	*Calculators*
Direct	3,000 @ ₹ 500	2,500 @ ₹ 150
Indirect	2,600 @ ₹ 500	1,800 @ ₹ 150
Actual sales for the current period were:		
Direct	2,800 @ ₹ 500	7,500 @ ₹ 150
Indirect	3,000 @ ₹ 500	2,000 @ ₹ 150

The marketing research wing of the company submits the following recommendations for the preparation of sales budget:

(i) The current budgeted sales of watches would increase by 5 per cent if their price is reduced by 2 per cent;

(ii) The current budgeted sales of calculators would increase by 2 per cent and 4 per cent in direct and indirect channels respectively with the help of sales promotions;

(iii) There will be 5 per cent increase in the current budgeted sales of watches only in case of direct channel if 5 more market outlets are opened; and

(iv) An increase of 2 per cent in the dealer's discount is expected to increase sales of indirect channel by 4 per cent.

The management has accepted all the above-mentioned recommendations of the research department. You are requested to prepare a sales budget incorporating the above recommendations.

Solution

Sales Budget

Electra Electronics Co. Ltd.

Market/Product	*Budget for Future Period*			*Budget for Current Period*			*Actual Sales for Current Period*		
	Qty. (Units)	*Price (₹)*	*Value (₹)*	*Qty. (Units)*	*Price (₹)*	*Value (₹)*	*Qty. (Units)*	*Price (₹)*	*Value (₹)*
Direct:									
Watches	3,300	490	16,17,000	3,000	500	15,00,000	2,800	500	14,00,000
Calculators	2,550	150	3,82,500	2,500	150	3,75,000	2,700	150	4,05,000
Total	5,850		19,99,500	5.500		18,75,000	5,500		18,05,000
Indirect:									
Watches	2,834	490	13,88,660	2,600	500	13,00,000	3,000	500	15,00,000
Calculators	1,944	150	2,91,600	1,800	150	2,70,000	2,000	150	3,00,000
Total	4,778		16,80,260	4,400		15,70,000	5,000		18,00,000
Total (Summary):									
Watches	6,130	490	30,05,660	5,600	500	28,00,000	5,800	500	29,00,000
Calculators	4,494	150	6,74,100	4,300	150	6,45,000	4,700	150	7,05,000
Total	10,628		36,79,760	9,900		34,45,000	10,500		36,05,000

Illustration 6.11: Super Sweet Company manufactures two products Y and Z and request you to prepare production budget and materials budget from the information given below:

(a) Sales division reports that the demand for Y and Z products of the company during budget period will be:

Budget Period	*Products*	
	Y (Units)	*Z (Units)*
Quarter 1st	12,000	20,000
Quarter 2nd	10,000	23,000
Quarter 3rd	13,000	10,000
Quarter 4th	15,000	12,000
Total	50,000	65,000

(b) The Department of production submitted the following details of raw material and its estimated cost:

(i) Product Y requires 2 units and 3 units of material A and material B respectively.

(ii) Product Z requires 3 units and 1 unit of material A and material B respectively.

(iii) The estimated cost of material A and B is ₹ 6 per unit and ₹ 3 per unit respectively.

(c) The desirable balance of stock at the commencement and at the end of quarters are:

(i) Finished stock

Quarter	*Opening Balances*		*Closing Balances*	
	Products			
	Y (Units)	*Z (Units)*	*Y (Units)*	*Z (Units)*
1st	2,000	1,200	1,300	2,200
2nd	1,100	1,800	1,500	1,700
3rd	3,200	2,200	1,000	2,000
4th	1,800	1,700	800	1,400

(ii) Raw materials

Quarter	*Opening Balances*		*Closing Balances*	
	Material			
	A (Units)	*B (Units)*	*A (Units)*	*B (Units)*
1st	6,000	12,000	5,000	3,000
2nd	5,400	8,000	7,000	6,000
3rd	7,000	11,000	6,500	5,000
4th	3,500	7,000	4,000	4,000

NOTES

Solution

Production Budget (in Units)

Particulars	*Quarter 1st*		*Quarter 2nd*		*Quarter 3rd*		*Quarter 4th*		*Total*	
	Y	*Z*	*Y*	*Z*	*Y*	*Z*	*Y*	*Z*	*Y*	*Z*
Sales (Demand)	12,000	20,000	10,000	23,000	13,000	10,000	15,000	12,000	50,000	65,000
Add: Closing stock	1,300	2,200	1,500	1,700	1,000	2,000	800	1,400	4,600	7,300
Less: Opening stock	2,300	1,200	1,100	1,800	3,200	2,200	1,800	1,700	8,100	6,900
Production	11,300	21,000	10,400	22,900	10,800	9,800	14,000	11,700	46,500	65,400

Material Budget

Particulars	*Quarter 1st*		*Quarter 2nd*		*Quarter 3rd*		*Quarter 4th*		*Total*	
	A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
Standard consumption	85,600	54,900	89,500	54,100	51,000	42,200	63,100	53,700	2,83,200	2,04,900
Add: Closing stock	5,000	3,000	7,000	6,000	6,500	5,000	4,000	4,000	22,500	18,000
Less: Opening stock	6,000	12,000	5,400	8,000	7,000	11,000	3,500	7,000	21,900	38,000
Material required (in units)	84,600	45,900	91,100	52,100	50,500	36,200	63,600	50,700	2,89,800	1,84,900
Price per kg (estimates)	6	3	6	3	6	3	6	3	6	3
Estimated material cost (material wise)	5,07,600	1,37,700	5,46,600	1,56,300	3,03,000	1,08,600	3,81,600	1,52,100	17,38,800	5,54,700
Total material cost		6,45,300		7,02,900		4,11,600		5,33,700		22,93,500

Working:

Calculation of standard consumption material wise.

Quarter 1st

	Y	*Z*
Estimated Production (Units)	11,300	21,000

Material required

Material A = 22,600 units for Y and 63,000 units for Z = 85,600

Material B = 33,900 units for Y and 21,000 units for Z = 54,900

Quarter 2nd

Estimated Production (Units)

	Y	*Z*
Material required	10,400	22,900

Material A = 20,800 units for Y and 68,700 units for Z = 89,500

Material B = 31,200 units for Y and 22,900 units for Z = 54,100

Quarter 3rd

	Y	*Z*
Estimated Production (Units)	10,800	9,800

Material required

Material A = 21,600 units for Y and 29,400 units for Z = 51,000

Material B = 32,400 units for Y and 9,800 units for Z = 42,200

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Quarter 4th

	Y	Z
Estimated Production (Units)	14,000	11,700

Material required
Material A = 28,000 units for Y and 35,100 units for Z = 63,100
Material B = 42,000 units for Y and 11,700 units for Z = 53,700

Illustration 6.12: Draw up a flexible budget for production at 75 per cent and 100 per cent capacity on the basis of the following data for a 50 per cent activity:

Particulars	*Per Unit (₹)*	(₹)
Materials	100	
Labour	50	
Variable expenses (direct)	10	
Administrative expenses (50 per cent fixed)		40,000
Distribution and advertising (60 per cent fixed)		50,000
Present production (50 per cent activity)		1,000 units

Solution

Flexible Budget

Particulars	*1,000 Units*		*1,500 Units*		*2,000 Units*	
	Per Unit (₹)	*Amount* (₹)	*Per Unit* (₹)	*Amount* (₹)	*Per Unit* (₹)	*Amount* (₹)
Material	100	1,00,000	100	1,50,000	100	2,00,000
Labour	50	50,000	50	75,000	50	1,00,000
Variable expenses	10	10,000	10	15,000	10	20,000
Adm. Expenses:						
Variable (50 per cent)	20	20,000	20	30,000	20	40,000
Fixed (50 per cent)	20	20,000	13.33	20,000	10	20,000
Dist. & Adv. Exp:						
Variable (40 per cent)	20	20,000	20	30,000	20	40,000
Fixed (60 per cent)	30	30,000	20	30,000	15	30.000
Cost of sales	250	2,50,000	233.33	3,50,000	225	4,50,000

Illustration 6.13: Prepare cash budget for the month of April to September 2012 from the information given below:

Months	*Estimated Sales* (₹)	*Estimated Purchases* (₹)	*Wages* (₹)
March	40,000	20,000	7,000
April	50,000	30,000	8,000
May	30,000	50,000	6,000
June	50,000	60,000	5,000
July	60,000	30,000	7,000
August	70,000	30,000	6,000
Sept.	40,000	20,000	8,000

Additional Information:

(i) Overheads to be incurred each month ₹ 3,000
(ii) Period of credit allowed by supplier is one month
(iii) Period of credit allowed to customers is one month
(iv) Estimated sales constitute 50 per cent credit sales
(v) Company is planning to purchase a machinery for ₹ 60,000 to be paid in three equal instalments from June onwards.
(vi) Cash balance on 1st April 2012 ₹ 6,000
(vii) Management policy to meet deficiency of cash stands as:
  (a) Upto ₹ 25,000 loans from banks
  (b) Exceeding ₹ 25,000 with the issue of debentures.

Solution

Cash Budget

(April to September 2012) *(in Rupees)*

Details	*April*	*May*	*June*	*July*	*August*	*Sept*
A. Balance b/d	6,000	20,000	21,000	nil	nil	6,000
B. Receipts						
Sales	25,000	15,000	25,000	30,000	35,000	20,000
Debtors	20,000	25,000	15,000	25,000	30,000	35,000
Bank	–	–	17,000	–	–	–
Debenture	–	–	–	35,000	–	–
Total B	45,000	40,000	57,000	90,000	65,000	55,000
Total (A & B)	51,000	60,000	78,000	90,000	65,000	61,000
C. Payments						
Purchases	20,000	30,000	50,000	60,000	30,000	30,000
Wages	8,000	6,000	5,000	7,000	6,000	8,000
Overhead	3,000	3,000	3,000	3,000	3,000	3,000
Machinery	–	–	20,000	20,000	20,000	–
Total C	31,000	39,000	78,000	90,000	59,000	41,000
D. Balance (A + B – C)	20,000	21,000	nil	nil	6,000	20,000

Check Your Progress

3. What are the different ways in which flexible budgeting can be incorporated?
4. Define operating budget.
5. Name the key budget that leads to the preparation of all other functional budgets.
6. List the budgets whose summaries are included in the production cost budget.
7. Mention the two major sections in the cash budget.

6.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

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1. To eliminate the danger of over capitalization and under capitalization, budgetary control helps by determining the total capital requirements of a business firm with the help of production budget and working capital estimates.
2. Under budgetary control system, every budget centre tries to achieve its objectives without taking into consideration the objectives of other budget centres and overall objectives of the budgetary control system. This creates conflict among various units of the organization which ultimately interrupts the efficiency of the system.
3. Flexible budgeting can be incorporated in one of two ways — step budget, wherein budgets are developed for different levels of operation, or variable budget, where budgets are prepared on a variable cost basis providing progressively greater budget allowances as the volume of activity increases.
4. The operating budget is a plan of the expected revenues and expenses from normal operations and activities that a firm desires to perform during the budget period which normally consists of one year.
5. Generally, sales budget is recognized as the key budget that leads to the preparation of all other functional budgets.
6. It is the production cost budget that includes the summaries of direct material budget, direct labour budget and manufacturing overhead budget.
7. The cash budget generally consists of the following two major sections, viz., receipt section and payment section.

6.5 SUMMARY

- Budgetary control plays a significant role in the profitability of a firm as it helps it to achieve production and marketing goals at a minimum cost.
- Budgetary planning and control is an effective management tool for planning, coordinating and controlling the various business activities.
- A budget is a detailed schedule of the proposed combinations of the various factors of production which the management deems to be the most profitable for the ensuring period.
- Budgetary control is a process of managing an organization in accordance with an approved budget in order to keep total expenditure

with authorized limits. It is designed to assist management in deciding the future course of action and to develop basis for evaluating the efficiency of operations.

- The time-span for budgeting will vary from organization to organization depending on number of factors such as nature of business, the degree of risk and uncertainty, financial resources, economic conditions etc.
- Fixed budget is a plan that expresses only one level of estimated activity or volume.
- A flexible budget is a budget which, by recognizing the difference between fixed, semi-fixed and variable costs, is designed to change in relation to the level of activity attained.
- The operating budget is a plan of the expected revenues and expenses form normal operations and activities.
- Capital budget is a plan of future investments in fixed assets and often includes amounts for large expenditure that have a long term impact on the financial position and growth of the firm.
- Short term budgets cover a budget period of year or shorter. Firms prefer to prepare short term budgets in the sales, cash overheads etc
- Long term budgets is a systematic and formalized process for purposeful directing and controlling future operations towards a desired objective for periods extending beyond one year.
- Master budget is an overall budget of the firm which includes all other small departmental budgets.
- Subsidiary budgets are those budgets which show income or expenditure appropriate to or the responsibility of a particular activity of the business.
- A sales budget is an estimate of future sales expressed and incorporated in quantities and/or money.
- Production budget is a component of the master budget that establishes the level of production planned for budget period.
- Materials budget is prepared with a view to ensure regular supply of raw material of the required quantity according to the requirements of production schedules.
- The labour budget indicates the quantity and cost of direct labour required to meet production needs.
- The manufacturing overhead budget is a schedule showing the expected amount of manufacturing cost that will be incurred for the budgeted level of activity.

6.6 KEY WORDS

- **Budget:** It is generally recognized as a plan of action to be pursued by an organization during a defined period of time in order to achieve it objectives.
- **Budgetary control:** It is a systematic process designed to plan and control the major activities of a firm's business through budgets prepared in advance with an objective to ensure effective use of resources.
- **Flexible budget:** It is 'a budget which, by recognizing the difference between fixed, semi-fixed and variable costs, is designed to change in relation to the level of activity attained.
- **Master budget:** It is a summary of the budget schedules in capsule forms made for the purpose of presenting in one report the highlights of the budget period.

6.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Explain the concept of Budgeting and Budgetary Control. Discuss the importance and objectives of budgetary control.
2. List the characteristics of a budget. Where does the responsibility for the budget process normally rest?
3. Define Master Budget. Explain its significance in industrial enterprise.
4. Mention the essentials of an effective budgetary control system.
5. Discuss the objectives and limitations of budgetary control.
6. Define the production budget. What are the principal considerations involved in budgeting production?
7. What is a flexible budget? How does it differ from fixed budget?

Long-Answer Questions

1. Explain various types of budgets that the management of a commercial enterprise would normally prepare.
2. Discuss the procedure for preparing the following budgets:
   (a) Cash budget
   (b) Production budget
   (c) Sales budget

3. Describe briefly the methods of preparing a sales budget. Discuss the principal factors that should be considered in developing the sales budget.
4. Write explanatory notes on:
   (i) Long term budget
   (ii) Budget manual
   (iii) Budgeting v/s Budgetary control
   (iv) Functional budget.
5. A market study reveals that there is a market for 75,000 units of PEE products. STAR Co. Ltd., were enjoying 60 per cent share of this market. However, it has been estimated that the company's market share will go down by 20 per cent for the budget period. The selling price of the PEE product is ₹ 20 per unit. The cost details of the product are given as under:

Raw material	₹ 6 per unit
Direct labour	₹ 3 per unit
Variable expenses	₹ 1 per unit
Fixed overhead	₹ 30,000

   Prepare a sales budget of the company for the year showing cost of production and gross profit.
6. The management of an industrial company decided to sell 90,000 units of Blue diamond. The engineering department of the company reported that the manufacturing of the product will require two types of material—BEE and DEE. Each unit of the product will require two units of BEE and one unit of DEE. The estimated cost of the BEE and DEE is ₹ 5 and ₹ 7 respectively. The stock balances as decided by management are:

Raw Material	*Opening (Units)*	*Closing (Units)*
BEE	3,000	5,000
TEE	4,000	3,000
Finished product		
Opening	14,000 units	
Closing	12,000 units	

   You are asked to prepare a production budget and direct material purchase budget.

7. EMM Co. provides the following information at 50 per cent capacity:

	(₹)
Fixed expenses:	
Salaries	1,50,000
Rent and taxes	1,20,000
Depreciation	1,80,000
Administrative expenses	2,10,000
Variable expenses:	
Materials	6,00,000
Wages	7,50,000
Others	1,20,000
Semi-variable expenses:	
Maintenance and repairs	3,00,000
Indirect labour	9,50,000
Others	2,70,000

It is reported that fixed expenses remain constant for all levels of production. Semi-variable expenses remain constant between 45 per cent and 65 per cent of capacity, increasing by 10 per cent between 65 per cent and 75 per cent capacity, and by 20 per cent between 75 per cent and 100 per cent capacity.

Estimated sales at various levels of capacity are:

Capacity	***Sales***
60 per cent	1,20,000
70 per cent	1,40,000
90 per cent	1,80,000

Prepare a flexible budget and forecast the profit or loss at 60 per cent, 70 per cent and 90 per cent capacity.

8. From the following information prepare a cash budget under:
   (i) The adjusted profit and loss method.
   (ii) Balance sheet method.

Balance Sheet as on 31 March, 2011

Liabilities	(₹)	***Assets***	(₹)
Share capital	75,000	Building	45,000
Reserves	7,000	Machinery	30,000
Debentures	15,000	Furniture & Fixtures	7,000
Profit & loss a/c	13,500	Debtors	39,000
Creditors	43,500	Closing stock	6,000
		Bank	27,000
	1,54,000		1,54,000

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Forecasted Trading and Profit and Loss Account

for the year ending 31st March, 2012

Particulars		**(₹)**	***Particulars***	**(₹)**
To Opening stock		6,000	By Sales	1,20,000
To Purchases		90,000	By Closing stock	15,000
To Gross profit c/d		39,000		–
		1,35,000		1,35,000
To Salaries	3,750			
Add: Outstanding	750	4,500	By Gross profit b/d	39,000
To Depreciation:			By Interest received	150
Machinery	3,000			
Furniture and Fixtures	1,500	4,500		
To Administrative				
Expenses		5,250		
To Distribution expenses		3,750		
To Net profit c/d		21,150		
		39,150		39,150
To Dividends paid		15,000	By Balance b/d	13,500
To Balance c/d		19,650	By Net profit	21,150
		34,650		34,650

Additional information for the forthcoming year is as follows:

(i) Share capital issued ₹ 15,000

(ii) Debentures issued ₹ 3,000

(iii) On 31st March, 1990, debtors were ₹ 30,000, creditors ₹ 45,000 and building ₹ 60,000.

6.8 FURTHER READINGS

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Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 7 STANDARD COSTING

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Structure

7.0 Introduction
7.1 Objectives
7.2 Meaning of Standard Costing
7.2.1 Advantages and Limitations of Standard Costing
7.3 The Standard Costing System
7.4 Answers to Check Your Progress Questions
7.5 Summary
7.6 Key Words
7.7 Self Assessment Questions and Exercises
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7.0 INTRODUCTION

To meet the growing demands of competition, firms must continuously search for ways to attain maximum operating efficiency. They can attain this objective by making optimum use of their available resources. Consequently, managerial actions need to be directed towards deficiencies and areas for improvement that can have the greatest impact on the firms' operating results. This requires that the management must not only have appropriate and timely information on what the results are but most importantly must also know how these results sound in comparison to the potential capabilities of the operation. It is within this context that the standard costing and variance analysis become an essential part of any useful system of control.

In ordinary language, the *standard* forms a yardstick that is used to measure weight, quantity, quality and value. It is a measure of acceptable cost performance of a given activity under controlled conditions. A *controlled* condition refers to a situation where every activity of the task is performed as per predetermined way and procedure. Thus, a standard cost is a scientific predetermination of what a unit of product should cost.

7.1 OBJECTIVES

After going through this unit, you will be able to

- Discuss the method of standard, estimated costs and standard costing
- Differentiate between standard costing, budgetary control and historical costing
- Explain the advantages and limitations of standard costing
- Describe the standard costing system

7.2 MEANING OF STANDARD COSTING

Although it might appear that standard and estimated costs are the same, some dissimilarity exists. An *estimated cost* is determined on basis of the average past performance and, therefore, can be regarded as a reasonable assessment of what a cost 'will be'. On the other hand, *standard cost* is the cost that would be incurred under the most efficient operating conditions and is forecast before the manufacturing process begins. Thus, it is a carefully predetermined cost used as a performance criteria—a measure what a cost should be. A *budgeted cost* is viewed as future cost (prediction, estimate, forecast) that is formally combined into an integrated plan of action.

It is the standard cost per unit of the budgeted quantity to be produced during a particular period.

Concept of Standard Costing

Standard costing is an important accounting-oriented tool which attempts to keep the cost at a minimum level by planning and controlling costs of each unit produced. Under this system, the cost of each unit is predetermined on some scientific basis and arrangements are made for costs not to exceed the predetermined standard.

In the words of Bigg (1975) standard costing is a system of costing where *a comparison is made of the actual cost with a pre-arranged standard and the cost of any deviations (called variances) is analysed by causes. This method permits management to investigate the reasons for these variances and to take suitable corrective action. It is, therefore, a system of cost control as well as cost ascertainment*.

According to the Chartered Institute of Management Accountants, London, *Standard costing is the preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence*.

Brown and Howard state, *Standard costing is a technique of cost accounting which compares the 'standard cost' of each product or service with the actual cost, to determine the efficiency of the operation, so that any remedial action may be taken immediately*.

To the author of this book, standard costing is *a system which attempts to predetermine costs with an aim to measure the efficiency of production. It calls for the determination of standard costs and their application to managerial problems particularly those problems relating to product costs and departmental cost control*. Thus, under standard costing system predetermined costs are carefully computed which are then compared with actual cost to aid in cost control. Accordingly, standard costing system involves the following steps:

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- Determination of standard cost for each element of cost—direct material, direct labour and overhead;
- Recording of both standard and actual costs in appropriate books of accounts;
- Computation of variance between standard cost and actual cost;
- Analysis and investigation of the variances; and
- Feed correction and suggested modifications where required.

The standard cost of a product consists of:

- Quantitative facts: Standard quantity of the given material, standard labour hours for specified operations and standard machine hours for the stated machines to be used;
- Price factors: Standard cost per rupee and per hour by which the standard quantities are converted to the standard product cost.

The quantitative factors are based on *engineered specifications* tempered by experience, and vice versa, whereas prices used are typically those which are expected to be representative of actual prices during the period for which the standards are established.

For control purposes, various actual activities of a period such as quantity of each type of material used, labour hours worked and machine hours involved, as well as units of goods produced are multiplied by appropriate unit standard cost to establish standard cost totals for work performance by job or process and by department. The actual costs of these activities are then compared with the standard costs and the resulting variances are examined so as to:

- aid the interpretation of financial results for the period;
- fix the responsibility for non-standard performance; and
- focus attention on areas in which cost improvement should be sought.

Standard Costing Vs. Historical Costing

Standard costing differs from historical costing on a number of grounds. However, the main differences are as under:

- Standard costing acts as a controlling device that does not only determine the cost of the given activity in advance but also aims to keep actual costs within the predetermined standard whereas historical costing fails to exercise any control over costs, as under this system, costs are the actual costs.
- Standard costing is a forward-looking tool whereas historical costing is a backward-looking device as it relates to the past by analysing the already incurred costs.

- The scope of standard costing starts well before the start of actual production whereas the application of historical costing begins after the production takes place.
- Installation of the standard costing system requires intelligence, technical skill and expertise on the part of the management whereas the historical costing system can be installed with ordinary capabilities.
- Standard costing system cannot operate effectively without a budgetary control system which is not true in case of historical costing.

Standard Costing Vs. Budgetary Control

Although in both the systems standards are predetermined with which actual results are compared to measure the business performance, yet they differ with each other on many issues. The main differences are summarized below:

- Budgetary control is wider in scope as compared to standard costing. Budgetary control covers all aspects of the business, for example, production, purchase, sales, finance, incomes, expenditure, etc. On the other hand, standard costing technique is limited only to production and production cost.
- Budgetary controls is employed to formulate business policies whereas standard costing helps management in cost ascertainment and fixation of selling price and at the same time attempts to keep the costs at minimum level.
- The partial introduction of budgetary control in any organization can easily be done. For example, the management would be interested to apply the budgeting system in the important areas of business like capital projects, research and development, etc. It can do it without much difficulty, however, partial installation of the standard costing system will not be of any use to the business.
- The preparation of budgets are mostly governed by past experience and at the most by the projection of the financial information as disclosed by various financial costing. Standard costing system is based on technical estimates.
- The budgeting system is less rigid as compared to the system of standard costing. Budgets fix limits whereas targets are fixed in standard costing.
- Standard costing cannot exist without effective budgeting system but a budgetary control can be operational without standard costing system.
- Under standard costing system, the analysis of variances is made according to their originating causes which is not true in case of variance analysis in budgetary control.
- An effective standard costing system involves standardization of products which is not necessarily required for budgetary control.

7.2.1 Advantages and Limitations of Standard Costing

The standard costing technique, if properly implemented, would result in the following benefits:

- Prices can be determined in anticipation of the actual production as standard costs for various inputs are already available.
- The standard costing system makes possible to determine and compare the efficiency of various operations.
- It eliminates wastages by detecting variances and suggesting corrective measures for them.
- It ensures better control as the performance criteria is known to workers, and naturally, they take more interest in work to achieve the standard.
- It brings about an improvement in production methods as it requires a continuous detailed examination of all important functions of the concern. It also results in reduction of costs.
- It provides continual incentives for management to keep costs and performance in tune with predetermined objective. The comparison between actual costs and predetermined standards is much more effective than a comparison between current actual costs and actual costs of prior period.
- Under standard costing system, variances are determined normally at the end of the month, or even on weekly basis to allow for more timely action in correcting inefficiencies.
- Standard costing system involves less clerical efforts than other costing systems because actual costs are recorded and accumulated by cost centre rather than by job.
- Standard costing system makes possible for the management to pay more attention to weak areas that require control as it follows the principle of management by exception.

Limitations of Standard Costing

The following are the limitations attached to standard costing:

- Fixation of standard is not possible for every type of work or operation.
- Wrong standards may result in wastage of time, money and energy.
- Fixation of standards is a time-consuming process as the standards fixed need to be reviewed from time to time; otherwise they lose importance for the purpose.
- Determination of actual cost is necessary for certain purposes, for example, preparation of cash budget, reconciliation of cost and financial accounts, etc.

- Despite the above limitations, a standard costing system is absolutely essential for efficient control. Standards must be fixed and implemented properly.

Check Your Progress

1. Compare the scope of budgetary control and standard costing.
2. Mention the principle followed in standard costing which makes it possible for the management to pay more attention to weak areas that require control.

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7.3 THE STANDARD COSTING SYSTEM

The standard costing system is designed to furnish management with a measure that will help it in making decisions regarding the efficiency of operations. A sound standard costing system consists of six main activities, viz.,

- Establishment of cost centre;
- Determination of the quality of standard;
- Organization of standard costing;
- Setting of standards;
- Actual cost accumulation; and
- Analysis of variance.

Establishment of Cost Centre

The standard costing system begins with the establishment of the cost centre which is usually a process, or an operation, or an item of equipment. It is a unit of activity within the factory to which costs may be practically and equitably assigned. Performance is assessed by comparing the actual cost with the performance standard which shows the costs the centre should have incurred given their actual activity.

Determination of Quality of Standard

Standards may be broadly classified into four types: ideal, normal, basis and attainable.

Ideal Standards: They are set at the level of maximum efficiency, representing conditions that can seldom be attained. Such a standard fails to pay any attention to normal materials spoilage and idle labour time. This type of standard can be used as the standard of perfection rather than a standard for the measurement of practical results because conditions that satisfy ideal standards are extremely rare. Over any extended period of time, it would be impossible for the actual activities to equal the ideal standard. On this

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plea such standards are also called theoretical standards. The setting of such standards may motivate employees to increase their output to the maximum but if the standards are still not attained their morale may be seriously affected. However, ideal standards are more effective for direct material costs and usage. The application of ideal standard makes variance accounts less significant for control purposes.

Normal Standards: They can be achieved by efficient working and management. They allow for normal workers performing in normal settings. Such standards are set after taking into consideration the conditions that are expected to prevail over a long period of time sufficient to reflect the effects of seasonal and cyclical fluctuations. These standards are of great significance for manufacturing overhead expenses.

Basic Standards: Also called long-range standards, they provide a measuring scale for performance over a long period of time. Such standards are not influenced by any change in material prices and labour rates and, therefore, remain unchanged for a number of years. Basic standards are useful for such items of expenditure that are fixed in nature. In the present dynamic business such standards are of no practical utility.

Attainable Standards: They are based on past performance and can be achieved with reasonable effort. Perhaps the standards should be somewhat lower than what can be achieved by earnest effort. Such standards are set as closely as possible to that level which represents anticipated conditions. They allow for usual production problems such as down time for maintenance, employee errors, or occasional inventory shortages. These standards are more realistic and satisfactory and thus represent desirable performance. Attainable standards are particularly useful in setting price standards for material and labour.

Organization of Standard Costing

The practices of standard setting vary from firm to firm. Management should take sufficient care in setting standards because the efficiency of a standard costing system largely depends upon the accuracy and reliability of the standards. In the past, the job of standard setting was the responsibility of the cost accountant. However, keeping in view the dynamic conditions of the present business, it requires the combined thinking and expertise of all persons who are responsible for fixing prices and quantities of inputs. Against this background, almost in every big organization, at present, this function is discharged by a *standard committee* consisting of representatives from various concerned departments of the organization. The said committee establishes and monitors standards for various costs and activities and is also responsible for changing and updating the standards when required. In determining the reliable standards, the committee must analyse and investigate all such variables and factors that have direct bearing on the workers' performance.

The important among them are:

- employee's attitude;
- organizational structure;
- government regulations;
- performance feedback; and
- labour–management relations.

Setting of Standards

One of the important components of the standard costing system is the setting of standards the evaluation of actual results. It includes detailed estimates of material quantities and prices, labour quantities and prices, and overhead quantities and rates. These details serve as the benchmarks of efficiency against which actual quantities and costs are compared. Accordingly, standards are needed to be fixed for each and every element of cost, viz.,

- direct material;
- direct labour; and
- overheads.

Direct Material Standard: It represents the amount of material cost to be incurred for producing a unit of output. The material cost is always affected by the price and quantity of material. Accordingly, the management has to set standards both for material quantity and for material price.

The quantity of raw material items required to manufacture a unit of output is the *material quantity standard*. Thus, it is a process that determines the quantity of material that should be priced to produce each unit it is manufactured. In calculating the raw material required to be included in the standard, consideration must be given to manufacturing scrap, normal material wastage, spoilage, etc. *Material price standard* is pre-determined price to be paid for obtaining the raw material for the output. A standard price is set for each class of material to be purchased. These standards should take into consideration economic order quantities, volume discounts, inbound transportation and expected short range pricing trends.

Direct Labour Standards: Just as it is necessary to set standards for material to fix upon a unit cost that may be used in all cases, regardless of fluctuations both in prices and in the amount of material used, it is also essential to fix direct labour standards to determine a unit labour cost which will remain fixed in spite of different rates of pay and different periods of time required to do the task.

Direct labour standard represents the amount of labour cost to be charged to total output cost. It is computed by multiplying standard labour rate by standard labour time. Thus, direct labour standard requires setting of two standards, viz., *labour time standard* and *labour rate standard*.

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The standard time required to perform each labour operation that enters into production for producing a product is known as *labour time standard*. Such standards are often established from work measurements and time-and-motion studies. Due consideration should also be given to the incentives offered to the labours in setting these standards. The setting of labour time standard requires a considerable amount of professional measurement. Based on a certain amount of subjectivity, these standards are often less certain and more sensitive to variation than material standards.

Labour rate standard is the predetermined labour rate to be charged to the output cost for services rendered by a labour on the output job. The fixation of such a standard requires careful attention to the company's wage payment method. Standard labour rates are often the result of collective bargaining agreement and union contracts. The management has to identify the class of labours suitable for each operation and accordingly has to fix rates for each group. Thus, the standard wage rate is usually a composite of many wage rates assuming a specific mix of employee skills.

Overhead Standards: Overhead standards are set for variable and fixed overheads. According to the Chartered Institute of Management Accountants, London, a variable overhead is a cost which tends to vary directly with the volume of output whereas fixed overhead is a cost which tends to be unaffected by variance in volume of output. Such standards are set after careful study of cost–volume analysis. The separation of factory overhead costs into fixed and variable components allows not only the prediction of costs but also a detailed examination of how costs behave relative to volume. This provides an opportunity to management to study the cost structure in relation to volumes of output.

Actual Cost Accumulation

The establishment of standards is followed by the accumulation of actual costs which are then compared with standards in performance reports. For accumulating actual manufacturing cost, firms use either a job order system or a process cost system. The application of standard costing gets much information from the cost data than is possible with just actual costs. A sound system of standard costing will help the management determine the type of required cost data and report such data.

Analysis of Variances

A variance represents the difference between an actual cost and its corresponding standard costs of material, labour and overheads. The variance is the measure of inefficiencies or efficiencies. The objectives of variance analysis are to:

- indicate whether costs are being kept under control.
- locate any apparent deficiency in cost control efforts.
- facilitate the identification of the probable causes of deviation from standard.
- assign responsibility for deviations that may have occurred.

Revision of Standards

A serious problem faced by the firms is to determine when standards should be revised. The setting up of standard for costing is an operation that requires careful investigation and calculation. Consequently standards are not altered except when conditions on which such standards are based undergo considerable change. Usually changes in product specification, apparent permanent changes in material prices, changes in methods of using labour, changes in labour rates, etc. are situations that require revision of standards. Thus change in standards is subject to a change in the conditions upon which they are based. However, some experts feel that revision of standards should be a continuous process. According to them the unrevised standards may fail to evaluate performance properly. Therefore, management must revise standards whenever quantity or price changes significantly so that they correspond to current conditions.

Typically, changes in price standards are more pronounced in present-day business than changes in quantity standards. At present, almost every business firm bears the consequences of inflation, therefore, the price standard must be adjusted accordingly. Such adjustments should be made by using price index number.

Quantity standards must be revised whenever there are improvements or changes in production procedure and/or mixes. Accordingly, it is quite usual for firms to freeze quantity standards for longer periods.

Often the standards are not entered in the accounting records but are used as statistical supplements in arriving at information for control purposes. However, when a standard cost system is tied in with the accounting system, any change in the standard demands re-costing of finished goods inventory and work-in-progress inventory.

Check Your Progress

3. List the factors that have a direct bearing on the workers' performance.
4. What are the two standards require for the setting of direct labour standard?
5. Mention the activity which comes after the establishment of standards in a standard costing system.

7.4 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. Budgetary control is wider in scope as compared to standard costing. Budgetary control covers all aspects of the business, for example, production, purchase, sales, finance, incomes, expenditure, etc. On the other hand, standard costing technique is limited only to production and production cost.
2. Standard costing system makes it possible for the management to pay more attention to weak areas that require control as it follows the principle of management by exception.
3. The important factors that have a direct bearing on the workers' performance include:
   - Employee's attitude;
   - Organization structure;
   - Government regulations;
   - Performance feedback; and
   - Labour-management relations.
4. Direct labour standard requires setting of two standards, viz., labour time standard and labour rate standard.
5. The establishment of standards is followed by the accumulation of actual costs which are then compared with standards in performance reports. For accumulating manufacturing cost, firms use either job order system or a process cost system.

7.5 SUMMARY

- The standard forms a yard stick that is used to measure weight, quantity, quality and value.
- An estimated cost is determined on basis of the average past performance and, therefore, can be regarded as a reasonable assessment of what a cost "will be".
- Standard cost is the cost that would be incurred under the most efficient operating conditions and is forecast before the manufacturing process begins
- A budgeted cost is viewed as future cost (prediction, estimate, forecast) that is formally combined into an integrated plan of action.
- Standard costing is a procedure under which predetermined costs are used to measure the efficiency of production.

NOTES

- The standard costing system begins with the establishment of the cost centre which is usually a process, or an operation or an item of equipment etc. It is a unit of activity within the factory to which costs may be practically and equitably assigned.
- Ideal standards are set at the level of maximum efficiency, representing conditions that can seldom if every be attainable.
- Normal standards are the standards that can be achieved by efficient working and efficient management. They allow for normal workers performance in normal settings.
- Basic standards provide a measuring scale for performance over a long period of time.
- Attainable standards based on past performance, can be achieved with reasonable eff ort.
- Direct material standards represent the amount of material cost to be incurred for producing a unit of output.
- Direct Labour Standard represents the amount of labour cost to be charged to total output cost.
- Labour Rate Standard is the pre-established labour rate to be charged to the output cost for the services rendered by a labour on a output job.
- Overhead standard is a cost which tends to vary directly with the volume of output.
- Fixed overhead is a cost which tends to be unaffected by variance in volume of output.
- A variance represents the difference between an actual cost and its corresponding standard costs of material, labour and overheads.

7.6 KEY WORDS

- **Estimated cost:** It is a cost determined on the basis of the average past performance.
- **Budgeted cost:** It is viewed as future cost that is formally combined into an integrated plan of action.
- **Standard costing:** It is a system which attempts to predetermine costs with an aim to measure the efficiency of production.
- **Cost centre:** It is a unit of activity within the factory to which costs may be practically and equitably assigned.
- **Variance:** It represents the different between an actual cost and its corresponding standard costs of material, labour and overheads.

7.7 SELF ASSESSMENT QUESTIONS AND EXERCISES

NOTES

Short-Answer Questions

1. Mention the steps in the standard costing system.
2. What does the standard cost of a product consist of?
3. Briefly describe the different types of standards.

Long-Answer Questions

1. Differentiate between standard costing, historical costing and budgetary control.
2. Explain the advantages and limitations of standard costing.
3. Describe the main activities of a sound standard costing system.

7.8 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 8 VARIANCE ANALYSIS

NOTES

Structure

8.0 Introduction
8.1 Objectives
8.2 Variances Analysis : Meaning, Significance and Types
8.3 Direct Material Variance
8.4 Labour Variances
8.5 Overhead Variance
8.6 Practical Problems
8.7 Answers to Check Your Progress Questions
8.8 Summary
8.9 Key Words
8.10 Self Assessment questions and Exercise
8.11 Further Readings

8.0 INTRODUCTION

In the previous unit, you were introduced to the steps involved in the standard costing process. Once the standards are established and the costs accumulated, the analysis of variance is done. Variance analysis is the process of analysing variances by sub-dividing the total variance in such a way that management can assign responsibility for any off standard performance. According to CIMA, London, Terminology, variance analysis is the process of computing the amount of variance and isolating the causes of variance between actual and standard. An important aspect of variance analysis is the need to separate controllable from uncontrollable variances. A detailed analysis of controllable variances will help the management to identify the persons responsible for its occurrence so that corrective action can be taken. In this unit, you will learn about the meaning, significance and types of variance analysis.

8.1 OBJECTIVES

After going through this unit, you will be able to:

- Describe the meaning, significance and types of variance analysis
- Explain the computations of material, labour and overheads variances

8.2 VARIANCES ANALYSIS : MEANING, SIGNIFICANCE AND TYPES

Variance is the difference between actual costs and standard costs during an accounting period. It refers to variation of actual results with planned results. Variance analysis is a systematic process which analyses and interprets the variances. It refers to the breaking down of total variances into different components. Normally, variances can take two forms, viz.,

- *Favourable variances*—when actual costs are less than the standard costs; and
- *Unfavourable variances*—when actual costs exceed the standard costs.

NOTES

Sometimes actual results are just equal to planned results; the situation is known as *zero variance*.

A systematic analysis of variances would help managers to improve performance by continuing activities that result in favourable variances and modifying other activities to eliminate or reduce unfavourable variances.

Thus, it helps in monitoring and improving a firm's performance. In making variance evaluation, the management often employs the principles of exception. The management pays less attention on such variances that indicate insignificant deviations and concentrates upon those that demand detailed investigation and corrective action.

Significance

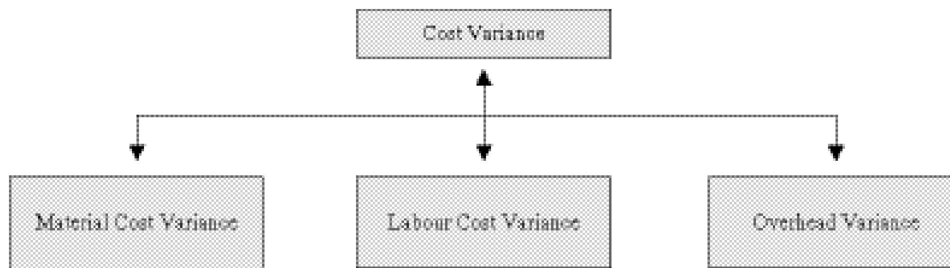
The following are the some of the points reflecting the significance of variance analysis:

- It is beneficial for making comparisons between budgeted and actuals therefore helps in future planning and setting business goals.
- It helps in identifying reasons for variance and therefore helps in taking corrective action.
- Difference sub-divisions helps in finding out detailed relationships between variances.
- It helps in assigning responsibility for every variance.
- It is beneficial for the cost control and cost reduction process.
- It reveals the degree of inefficiency.
- It helps in communicating the unfavourable variances to the management.
- It assists with proper profit planning.
- It helps in creating a cost-conscious environment for employees to work accordingly.

Types of Variances

Variances are computed for all the three basic cost elements of manufacturing—direct material, direct labour and manufacturing overheads. Thus, there are three types of variances, viz.,:

- direct material variance;
- director labour variance; and
- overhead variance.



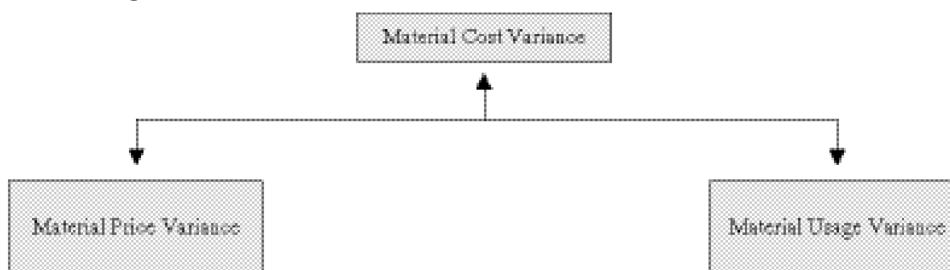
NOTES

Let's discuss each of these variances in the following sections.

8.3 DIRECT MATERIAL VARIANCE

As discussed earlier, standards may be established for the cost of obtaining materials and for the quantities to be used in production. Accordingly, actual costs can be compared against these standards and variances can be computed. With the result, basically there can be only two types of material variances viz.,

- price variance; and
- usage variance



Material Cost Variance (MCV): Material cost variance represents the difference between the actual costs and the standard costs of material for a specified output. The actual cost is computed by multiplying actual price with the actual quantity of material. In the same way standard cost is computed by multiplying the standard price with the standard quantity of material. Cost analysts can also develop other variances of material cost to meet specialized purposes of management. However, such variances may either be related to price, quantity or to the combination of price and quantity. Material cost variance can be expressed in abbreviated form as shown below:

$$MCV = (SP \times SQ) - (AP \times AQ)$$

where

SP = Standard price

SQ = Standard quantity

AP = Actual price

AQ = Actual quantity

Note: Standard quantity should be taken for actual output.

NOTES

Illustration 8.1: Compute material cost variance for a output of 200 units from the information given below:

Standard quantity	= 3 kg. per unit of output
Standard price	= ₹ 2 per kg.
Actual quantity consumed	= 550 kg.
Actual price	= ₹ 3 per kg.

Solution

Material cost variance = (Total standard cost –Total actual cost)

MCV = (SP × SQ) – (AP × AQ)

= (2 × 600) – (3 × 550)

= 1,200 – 1,650

= ₹ 450 unfavourable.

Material Price Variance (MPV): The material price variance attempts to measure the variance between the actual cost of material and the standard cost expected to be paid for the material. It reflects the actual unit of material above or below the standard unit cost, multiplied by the actual quantity of material used. Management sets price for each class of material. A systematic and scientific purchasing function will attain the standard price. The payment of lower prices by the purchasing department for a given quantity would result in a favourable material price variance and thereby maintain the required standard; whereas purchasing department will fail to meet the standard if it pays higher prices that will reflect an unfavourable material price variance. The material price variance is computed as follows:

Material price variance = (Standard price – Actual price) × Actual quantity

or MPV = (SP – AP) × AQ

Illustration 8.2: Calculate material price variance from the information as given in Illustration 8.1

Solution

Material price variance = (Standard price – Actual price) × Actual quantity

MPV = (2 – 3) × 550

= 1 × 550

= ₹ 550 unfavourable.

Material Usage Variance (MUV): Material usage variance is the deviation caused due to difference in the standard and actual quantities used. It indicates the actual quantity of direct material used above or below the standard price. The material usage variance is computed with the help of following formula:

NOTES

Material usage variance = (Standard quantity – Actual quantity) × Standard price

or MUV = (SQ – AQ) × SP

This variance can also be calculated as follows:

Material usage variance = (Standard price of standard quantity – Standard price of actual quantity)

or MUV = (SPSQ – SPAQ)

Illustration 8.3: With the help of information given in Illustration 8.1, calculate material usage variance.

Solution

Material usage variance = (Standard quantity – Actual quantity) × Standard price

MUV = (600 – 550) × 2

= 50 × 2

= ₹ 100 favourable

or MUV = (Standard price of standard quantity – Standard price of actual quantity)

= 1,200 – 1,100

= ₹ 100 favourable

Illustration 8.4: Suba, an engineering industrial enterprise manufactured 100 items of product 'EXX'. Compute material cost variances from the information given below:

Standard quantity	2 kg per item
Standard price	₹ 5 per kg
Actual quantity	3 kg per item
Actual price	₹ 4 per kg

Solution

Material Cost Variance = (Standard cost – Actual cost)

MCV = (SQ × SP) – (AQ × AP)

= (200 × 5) – (300 × 4) = 1,000 – 1,200

= – ₹ 200 unfavourable

Material price variance = (Standard price – Actual price) × Actual quantity

MPV = (5 – 4) × 300 = 1 × 300

= ₹ 300 favourable

Material usage variance = (Standard quantity – Actual quantity) × Standard price

MUV = (200 – 300) × 5 = 100 × 5

= ₹ 500 unfavourable

Verification

$$\text{MCV} = \text{MPV} + \text{MUV}$$

$$₹\ 200\ (U) = ₹\ 300\ (F) + ₹\ 500\ (U)$$

$$₹\ 200\ (U) = ₹\ 200\ (U)$$

NOTES

The total material cost variance can also be analysed graphically as shown in Figure 8.1.

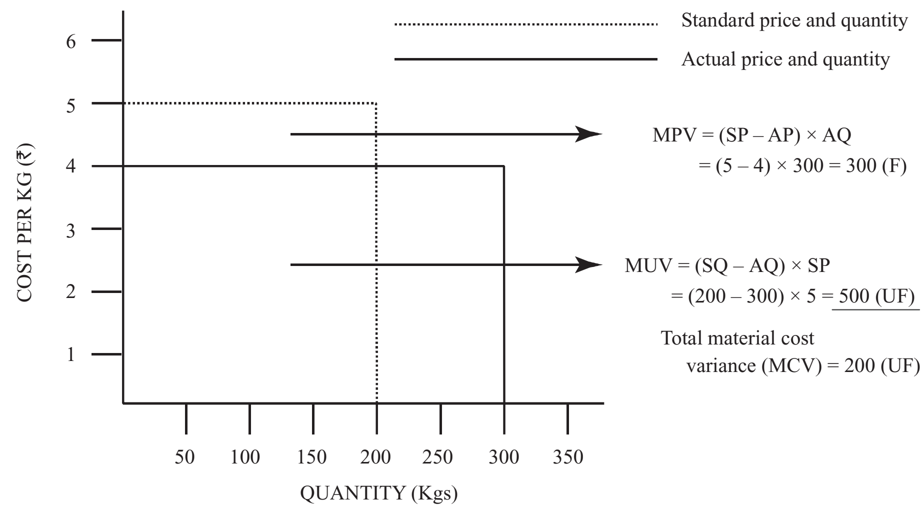


Fig. 8.1

The Management can analyse material price and usage variances and then investigate them by asking:

- Why has excess material been used? (MUV = 500UF)
- What is the difference between actual and standard costs for the material? (MPV = 300F)

Sub-variances of Material Usage Variance: Material usage can be further sub-divided into:

- material mix variance;
- material revised usage variance; and
- material yield variance.

Material Mix Variance: When the manufacturing of the product requires input of more than one type of raw material, then raw materials are mixed together in standard proportions. The standard proportion is impossible to maintain when there is temporary shortage of any type of material because the said material is to be substituted by available material. As a consequence, the standard mix of material has to be changed. Since different materials have different costs, the cost of an actual (*i.e.,* non-standard) mix will vary from the standard cost of the standard mix which gives rise to a direct material mix variance.

NOTES

According to the Chartered Institute of Management Accountants, London, material mix variance is *that portion of the direct material usage variance which is due to the difference between the standard and actual composition of the mixture*. This variance can be expressed by the following formulas:

- Material mix variance = (standard cost of standard mix – standard cost of actual mix*)
- Material mix variance = (revised standard mix of actual input – actual mix) × Standard price
- The revised standard mix is computed with the help of following formula:

$$\text{Revised standard mix} = \frac{\text{Standard quantity of a particular material}}{\text{Total standard quantity}} \times \text{Total actual quantity}$$

Note: If total weight of standard mix and total weight of actual mix is same, the Revised standard quantity mix is not required to be calculated.

Illustration 8.5: Compute material mix variance from the information given below:

Material	*Standard*			*Actual*		
	Quantity (kg)	*Price (₹)*	*Value (₹)*	*Quantity (kg)*	*Price (₹)*	*Value (₹)*
X	60	4	240	50	3	150
Y	40	2	80	40	3	120
Z	30	3	90	40	4	160
	130		410	130		430

Solution

The computation of material mix variance requires, revised standard quantity which is calculated as under:

$$\text{Revised standard quantity} = \frac{\text{Standard quantity of a particular material}}{\text{Total standard quantity}} \times \text{Total actual quantity}$$

$$\text{Material X} = \frac{60}{130} \times 130 = 60 \text{ kg}$$

$$\text{Material Y} = \frac{40}{130} \times 130 = 40 \text{ kg}$$

$$\text{Material Z} = \frac{30}{130} \times 130 = 30\text{kg}$$

The above results clearly reveal that the revised standard mix is equal to the standard mix. Under such a situation formula for the calculation of material mix is the same as for calculating material usage variance.

* Standard cost of standard mix and actual mix is to be calculated for actual quantity of output.

NOTES

Material mix variance (MMV)	=	(SQ – AQ) × SP
For material X = (60 – 50) × 4	=	₹ 40 (F)
For material Y = (40 – 40) × 2	=	0
For material Z = (30 – 40) × 3	=	₹ 30 (UF)
		₹ 10 (F)

Thus, we found that difference in material mix is the only cause responsible for material usage variance. However, when standard weight and actual weight of material mix varies, the quantity variance shall be due to mix accompanied by other reasons. Under such a situation Material Usage Variance (MUV) would be equal to Material Mix Variance (MMV) and Material Revised Usage Variance (MRUV). Material Revised Usage Variance is computed as follows:

Material revised usage variance = (Standard quantity – Revised standard quantity) × Standard price

(MRUV) = (SQ – RSQ) × SP

The variance will be favourable if standard quantity is greater than revised standard quantity and vice versa.

Note: Normally material revised usage variance is calculated only when question is silent about the output because under such a situation it is not possible to calculate material yield variance. Otherwise Material revised usage variance is not usually calculated.

Illustration 8.6 Calculate (a) Material usage variance (b) Material mix variance and (c) Material revised usage variance from the following information:

Material	*Standard*			*Actual*		
	Quantity (kg)	*Price (₹)*	*Value (₹)*	*Quantity (kg)*	*Price (₹)*	*Value (₹)*
EXX	70	5	350	80	4	320
YA	30	6	180	40	7	280
	100		530	120		600

Solution

Material usage variance (MUV)	=	(SQ – AQ) × SP		
For material EXX	=	(70 – 80) × 5	=	50 (UF)
For material YA	=	(30 – 40) × 6	=	60 (UF)
Total MUV			=	110 (UF)
Material mix variance (MMV)	=	(RSQ – AQ) × SP		
For material EXX	=	(84 – 80) × 5	=	20 (F)
For material YA	=	(36 – 40) × 6	=	24 (UF)
Total MMV			=	4 (UF)
Material revised usage variance (MRUV)	=	(SQ – RSQ) × SP		
For material EXX	=	(70 – 84) × 5	=	60 (UF)
For material YA	=	(30 – 36) × 6	=	36 (UF)
Total MUV			=	106 (UF)

Verification

Material usage variance = Material mix variance + Material revised usage variance

110 (UF) = 4(UF) + 106 (UF)

110 (UF) = 110 (UF)

NOTES

Material Yield Variance: According to the Chartered Institute of Management Accountants, London, Material yield variance is *that portion of direct material usage variance which is due to the difference between the standard yield specified and the actual yield obtained*. It may be due to low quality of material, mishandling of materials, inefficient production systems, etc. If the actual output is less than the standard output, the variance is treated adverse and vice versa. Material yield variance is the only variance which is calculated on the basis of output whereas the rest are calculated on the basis of input.

Material yield variance has the same numerical results as material revised usage variance. Thus, they represent the two sides of the same coin because MYV represents the difference between the standard output and the actual output and is calculated on the basis of actual output whereas MRUV is calculated on the basis of input.

Material yield variance is calculated with the help of the following formula:

Material yield variance (MYV) = (Standard yield – Actual yield) × Standard rate

or MYV = Standard loss of actual mix – Actual loss of actual mix × Standard cost per unit

Illustration 8.7: Super Max Co. Ltd. which has adopted standard costing furnishes the following information:

Material	*Standard*			*Actual*		
	Quantity (kg)	*Price (₹)*	*Value (₹)*	*Quantity (kg)*	*Price (₹)*	*Value (₹)*
X	60	5	300	55	6	330
Y	40	4	160	45	4	180
	100		460	100		510
Loss	10		—	20		—
	90		460	80		510

Calculate the material yield variance.

Solution

Material yield variance (MYV) = (Standard yield – Actual yield) × Standard rate

MYV = (90 – 80) × 5.11

= 10 × 5.11

= 51.11 unfavourable

NOTES

As mentioned earlier, Material yield variance can also be calculated on the basis of standard loss and actual loss like:

or MYV = (Standard loss of actual mix – Actual loss of actual mix) × Standard cost per unit

MYV = (10 – 20) × 5.11 = 51.11 unfavourable

Working:

Calculation of standard rate:

1. $$\text{Standard rate} = \frac{\text{Standared cost of standard mix}}{\text{Net standard output}} = \frac{460}{90} = ₹\ 5.11$$

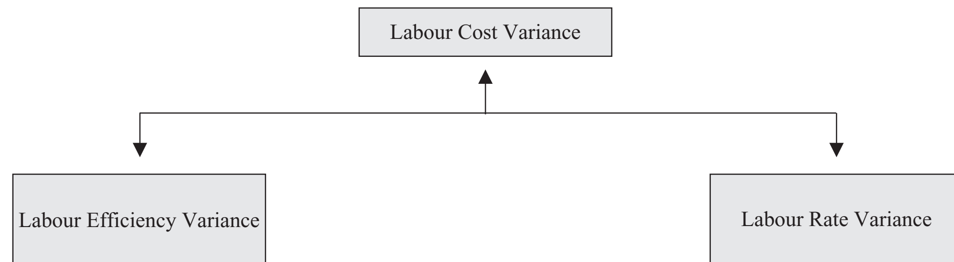
Check Your Progress

1. What are favourable and unfavourable variances?
2. What would the payment of lower price by purchasing department for a given quality would result in?
3. Mention the formula for material yield variance.

8.4 LABOUR VARIANCES

Labour variances are determined by comparing predetermined labour standards with the actual cost of productive labour. Such variances are calculated in the same way as material variances. Labour variances fall into the following three categories:

- labour cost variance;
- labour efficiency variance; and
- labour rate variance.



Labour Cost Variance: Labour cost variance represents the difference between standard labour cost specified for the activity and the actual labour cost paid for the activity. This can be expressed in an abbreviated form as follows:

Labour cost variance (LCV) = (standard labour cost – actual labour cost)

OR LCV = (SH × SR) – (AH × AR)

where,

SH = standard hour

SR = standard rate

AH = actual hour

AR = actual rate

NOTES

Illustration 8.8: EX YA engaged 75 workers at an average rate of ₹ 3 per day. The work was completed within 4 days. The standard cost set for the specified work amounts to ₹ 850. Compute labour cost variance.

Solution

Labour cost variance (LCV) = (850) – (75 × 4 × 3)
= (850 – 900)
= ₹ 50 unfavourable

Labour Efficiency Variance: Labour efficiency has direct effect on labour cost. Labour efficiency variance indicates the number of actual direct labour (in terms of hours) worked above or below the standard for the actual level of production at standard price. The labour quantity variance is measured in much the same way as the material quantity variance. Such a variance is caused by using more or less labour than the standard for the output produced. If time consumed on actual work is less than standard, labour has been used efficiently and accordingly labour efficiency variance is favourable. In the same way, labour efficiency variance is unfavourable when actual time consumed is more than the standard labour time. Labour efficiency variance can be determined by applying the following formula:

Labour efficiency variance (LEV) = (Standard hours – Actual hours) × Standard rate per hour

Illustration 8.9: EXX Company sets 30 hours at a wage rate of ₹ 4 per hour for a given task. The given task was completed within 7 days with 4 hours of daily work. Compute labour efficiency variance.

Solution

Labour efficiency variance = (30 – 28) × 4
= 2 × 4
= ₹ 8 favourable

Labour Rate Variance: Labour rate variance represents the average of the actual hourly rate paid above or below the standard hourly rate, multiplied by the actual number of hours worked. Such variance is often created by transferring workers with high pay rates to jobs that call for low standard rates or by authorizing overtime work at premium pay. The labour rate variance may be expressed as a formula:

Labour rate variance (LRV)

= Standard wage rate per hour – Actual wage rate per hour × Actual hours worked

NOTES

Illustration 8.10: TEE Co. Ltd. sets five hours as labour time standard for processing one unit of product 'EX' at a standard direct labour rate of ₹ 5 per hour. During the month of May, the company used 6,000 actual direct labour hours at ₹ 4 per hour to process 1,000 units of product EX. Compute labour cost variances.

Solution

Labour cost variance (LCV)	=	(SH × SR) – (AH × AR)
	=	(5,000 × 5) – (6,000 × 4)
	=	25,000 – 24,000
	=	₹ 1,000 (F)
Labour efficiency variance (LEV)	=	(SH – AH) × SR
	=	(5,000 – 6,000) × 5
	=	₹ 5,000 (UF)
Labour rate variance (LRV)	=	(SR – AR) × AH
	=	(5 – 4) × 6,000
	=	₹ 6,000 (F)

Verification

LCV	= LEV + LRV
₹ 1,000 (F)	= ₹ 5,000 (UF) + ₹ 6,000 (F)
₹ 1,000(F)	= ₹ 1,000 (F)

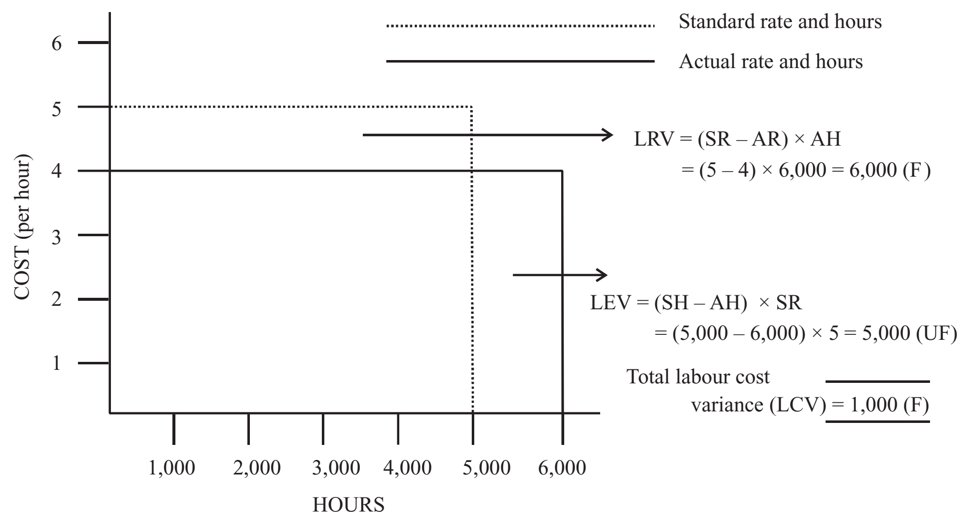


Fig. 8.2

The above labour cost variance can be analysed graphically as shown in Figure 8.2.

Idle Time Variance: Management must consider idle time while calculating labour cost variance. Idle time represents the amount of period for which workers would not work due to abnormal happenings like machine breakdowns, power failure, lockouts, etc. Idle time must be separated from actual working hours otherwise workers may be blamed for an adverse efficiency variance which has, in fact, nothing to do with them. Thus, idle time variance should be segregated from labour efficiency variance. Idle time variance is computed as under:

Idle time variance = Idle hours × Standard hourly rate

Example: If in Illustration 8.10, 6,000 actual hours include 500 hours of idle time then an adverse idle variance would arise and is calculated as follows:

Idle time variance = Idle hours × Standard hourly rate
= 500 × 5
= ₹ 2,500 adverse

This would increase the efficiency variance by a similar amount, *i.e.,* from 5,000 (UF) to 2,500 (UF) because the efficiency variance shall not be calculated on the basis of 5,500 hours, *i.e.,* the actual time worked on the job.

Labour efficiency variance = (5,000 – 5,500) × 5
= ₹ 2,500 (UF)

Under such a situation labour cost variance would be equal to labour rate variance, labour efficiency variance and labour idle time variance. Thus:

LCV = LRV + LEV + LITV
= 6,000 (F) + 2,500 (UF) + 2,500 (UF)
= ₹ 1,000 (F)

Labour Mix Variance (LMV): Like material mix variance, labour mix variance is possible where more than one type of labour is used for the job. Labour mix variance represents the variance due to the change in standard and actual labour force composition. This variance is calculated with the help of following formula:

Labour mix variance = (Revised standard hours – Actual hours) × Standard rate

LMV = (RSH – AH) × SR

Thus, labour mix variance compares actual hours with revised standard hours and is calculated as under:

$$\text{Revised standard hour} = \frac{\text{Standard hour of particular grade}}{\text{Total standard hour}} \times \text{Total actual hour}$$

NOTES

Like material mix variance, if actual and standard hours of the labour mix are same, then labour efficiency variance can be the result of difference in labour mix only. However, when standard and actual hours of labour mix vary, labour efficiency variance shall be due to mix as well as due to reasons other than mix. The formula used for calculating labour mix variance when standard and actual hours for the labour mix are same, is as under:

Labour mix variance = (Standard cost of standard labour mix

– Standard cost of actual labour mix)

Illustration 8.11: Calculate Labour mix variance from the following:

Material	*Standard*			*Actual*		
	Hours	*Rate* (₹)	*Amount* (₹)	*Hours*	*Rate* (₹)	*Amount* (₹)
Men	600	3	1,800	550	4	2,200
Women	800	2	1,600	850	1.50	1,275
	1,400		3,400	1,400		3,475

Solution

In this illustration total standard and actual hours are the same, therefore, for the calculation of Labour mix variance, the following formula will be more appropriate:

Labour mix variance = Standard cost of standard mix – Standard cost of actual mix

Thus,

LMV = (SR × SH) – (SR × AH)

For men = (3 × 600) – (3 × 550)

= 1,800 – 1,650

= ₹ 150 (F)

For women = (2 × 800) – (2 × 850)

= 1,600 – 1,700

= ₹ 100 (A)

LMV = 150 (F) + 100 (A)

= ₹ 50(F)

Thus, from the above results, it is clear that labour mix variance is only due to change in mix, therefore, labour mix variance is also equal to labour efficiency variance in this illustration which also amounts to 50(F) as calculated under:

Labour efficiency variance (LEV) = (SH – AH) × SR

For men = (600 – 550) × 3 = 150 (F)

For women = (800 – 850) × 2 = 100 (UF)

LEV = 50 (F)

Illustration 8.12: Compute Labour mix variance from the information given below:

Material	*Standard*			*Actual*		
	Hours	*Rate* (₹)	*Amount* (₹)	*Hours*	*Rate* (₹)	*Amount* (₹)
Skilled	75	4	300	80	5	400
Unskilled	50	3	150	70	2	140
	125		450	150		540

NOTES

Solution

In this illustration, standard and actual labour mix differs, therefore, the standard labour mix is to be revised in the computation of labour mix variance and accordingly the following formula will be used for the purpose:

Labour mix variance = (Revised labour hours – Actual hours) × Standard rate

For skilled workers = (90* – 80) × 4

= 10 × 4 = ₹ 40 (F)

For unskilled workers = (60* – 70) × 3

= 10 × 3 = ₹ 30 (UF)

Total LMV = ₹ 40 (F) + ₹ 30 (UF)

= ₹ 10 (F)

**Calculation of revised standard hours*

$$\text{RSH} = \frac{\text{Standard hour of the particular category}}{\text{Total standard hour}} \times \text{Total actual hour}$$

For skilled workers = 75/125 × 150 = 90 hours

For unskilled workers = 50/25 × 150 = 60 hours

Labour efficiency variance in the above problem is the result of labour mix variance and labour revised efficiency variance. In order to verify the same, we have to calculate labour efficiency variance and labour revised efficiency variance from it. But before we may do so, let us have first some discussion on labour revised efficiency variance.

Labour Revised Efficiency Variance (LREV): Labour revised efficiency variance represents the deviation between the standard labour hours specified for the activity achieved and the labour time spent for the same. The formula for such a variance will be:

Labour revised efficiency variance = (Standard hour – Revised standard hours) × Standard rate

Labour revised efficiency variance is favourable if the revised standard hours (RSH) are less than standard hours (SH) and vice versa.

NOTES

Illustration 8.13: From Illustration 8.12, cited above, let us now calculate labour efficiency variance and labour revised efficiency variance in order to check that LEV = LMV + LREV

Solution

Labour efficiency variance (LEV)	= (SH – AH) × SR	
For skilled workers	= (75 – 80) × 4	= ₹ 20 UF
For unskilled workers	= (50 – 70) × 3	= ₹ 60 UF
LEV	=	₹ 80 UF
Labour revised efficiency variance (LREV)	= (SH – RSH) × SR	
For skilled workers	= (75 – 90) × 4	= ₹ 60 UF
For unskilled workers	= (50 – 60) × 3	= ₹ 30 UF
LREV	=	₹ 90 UF

Verification

LEV	= LMV + LREV
₹ 80 (UF)	= ₹ 10 (F)* + ₹ 90 (UF)

* Labour mix variance is already calculated in Illustration 8.12.

Labour Yield Variance (LYV): It represents that portion of labour efficiency variance which is due to difference between the standard output and the actual output. If the actual labour output is higher as compared to the relative standard, then variance would be favourable and vice versa. The labour yield variance is always equal to revised efficiency variance because the former is calculated on the basis of output while the latter is calculated on the basis of input. The formula for its computation is as follows:

Labour yield variance = Standard output for actual mix – Actual output × Standard cost per unit

Illustration 8.14: In a manufacturing concern, the standard time fixed for a unit is 7 hours. A standard wage rate of ₹ 20 per hour has been fixed. During the month 600 units were produced against a standard output of 750 units. Calculate labour yield variance.

Solution

Labour yield variance = (Standard yield – Actual yield) × Standard cost per unit

= (750 – 600) × 140*

= 150 × 140

₹ 21.000 unfavourable

** Calculation of standard cost per unit:*

Standard cost per unit = Standard hours per unit × Standard rate per unit
= 7 × 20 = ₹ 140

8.5 OVERHEAD VARIANCE

NOTES

Overhead costs are indirect costs of material, labour and other overhead that contain both fixed and variable components. The analysis of overhead variance is somewhat difficult than direct cost variances. The purpose of overhead variance analysis is to see whether the price paid and the quantity used for indirect elements of cost vary or not as compared to specified standard figures. Thus, overhead variance represent the difference between the amount of overhead applied to production during the period and the amount of actual overhead cost incurred during the period. It is the difference between the standard overhead and the actual overhead assigned to the products. The total overhead variance is computed as followed:

Overhead cost variance = (Applied overhead* – Actual overhead)

* The applied overhead for the period is computed as follows:

Applied overhead = Standard hour per unit of output × Standard overhead rate per hour × Actual output

OR Standard overhead cost per unit × Actual output

Illustration 8.15: From the information given below compute overhead cost variance:

Fixed overheads:	
Budgeted	₹ 3,000
Actual	₹ 3,000
Variable overheads:	
Budgeted	₹ 1,500
Actual	₹ 3,000
Output	
Budgeted	3,000 units
Actual	2,500 units

Solution

Overhead cost variance = (Applied overhead* – Actual overhead)
= (₹ 3,750 – ₹ 6,000)
= ₹ 2,250 (unfavourable)

* *Calculation of applied overheads*

Applied overhead = (Standard overhead costs per unit** × Actual output)

= (₹ 1.50 × 2,500)

= ₹ 3,750

NOTES

$$\text{**Standard overhead cost per unit} = \frac{\text{Budgeted overheads}}{\text{Budgeted output}}$$

$$= \frac{4,500}{3,000}$$

= ₹ 150 per unit

Classification of Overhead Variance: The two major classes of overhead variance can be:

(i) Variable overhead variance; and

(ii) Fixed overhead variance.

Variable Overhead Variance (VOV): Variable overhead variance represents the difference between actual variable overheads and the specified variable overheads. Such variance may arise due to any change in manufacturing, administration, selling and distribution overheads. The variable overhead is fairly straight forward as it will vary more or less directly with output. Symbolically,

Variable overhead variance = Standard variable overhead* – Actual variable overhead

* Standard variable overhead = Actual output × Standard variable overhead rate**

** Standard variable overhead rate = Budgeting variable overhead ÷ Standard output specified

Variable overhead variance can be further divided into two categories viz.,

(a) ***Variable overhead expenditure variance (VOEXV)*** It is the difference between actual variable overhead expenditure and the standard variable overheads for the actual hours of operation. In formula form the variable overhead expenditure variance is:

Variable overhead expenditure variance = (Standard variable overhead – Actual variable overhead)

(b) ***Variable overhead efficiency variance (VOEFV):*** The variable overhead efficiency variance reveals the difference in variable overhead cost as a result of using more or fewer hours than set for the manufacture of the products. It measures the cost impact upon variable overheads caused by the labour efficiency. Thus, it does not result from the saving or improper use of overhead or favourable or unfavourable overhead prices. Variable overhead efficiency variance may be expressed as a formula:

$$\text{Variable overhead efficiency variance} = \left[\text{Standard labour hours for actual unit produced} - \text{Actual labour hours worked}\right] \times \text{Standard variable overhead rate per hour}$$

Illustration 8.16: Operating and accounting figures for the month of March 1990 with respect to variable overheads are:

NOTES

Budgeted output	14,000 units
Actual output	12,000 units
Budgeted hours	25,000
Actual hours	30,000
Budgeted variable overheads	₹ 7,000
Actual variable overhead	₹ 9,000

Compute variable overhead variances.

Solution

Variable overhead variance (VOC) = (Standard variable overhead – Actual variable overhead)

VOV = (SVO – AVO)

= (6,000 – 9,000)

= ₹ 3,000 unfavourable.

Variable overhead expenditure variance = (Standard variable overhead – Actual variable overhead)

(VOEXV) = (SVO – AVO)

= ₹ 8,400 – ₹ 9,000

= ₹ 600 unfavourable

$$\text{Variable overhead efficiency variance (VOFCV)} = \left[\text{Standard labour hours for actual unit produced} - \text{Actual labour hours worked}\right] \times \text{Standard variable over head rate per hour}$$

= (SVOH – AVOH) = (21,429 – 30,000) × 0.28 hour

= 8,571 × 0.28 hour = 2,400 unfavourable

Verification

VOC = VOEXV + VOEFV

₹ 3,000 (UF) = ₹ 600 (UF) + 2,400 (UF)

₹ 3,000 (UF) = ₹ 3,000 (UF)

Fixed Overhead Variance (FOV): Fixed overhead variance represents the amount of variation between the fixed overheads for specified production and actual fixed overheads. Such variances would speak of over- or under-recovery of fixed overhead. The variances are probably the most difficult ones to appreciate and they have the largest number of any of the variance. This can be computed by applying the following formula:

Fixed Overhead Variance (FOV) = (Standard fixed overheads* – Actual fixed overheads)

FOV = (SFO – AFO)

NOTES

* To be calculated for actual production.

Variance will be favourable if actual fixed overhead are less than the standard fixed overheads and it will be unfavourable or adverse if actual fixed overheads are more than the standard fixed overheads.

Fixed overhead variance can be further divided into two sub-variances viz.,

- expenditure variance; and
- capacity/volume variance.

Fixed Overhead Expenditure (or spending) Variance (FOEV): Expenditure variance represents the amount of difference between the budgeted and actual totals for fixed overhead costs. Price differentials and composition changes in fixed overhead items are the major reason for such a variance. It is calculated as follows:

Fixed overhead expenditure variance (FOEPV) = Total budget fixed overhead – Total actual fixed overhead

FOEPV = (BFO – AFO)

If the AFO is less than the BFO on actual production, the variance is favourable and vice versa.

Fixed Overhead Volume Variance (FOVV): The second variance developed in connection with fixed overhead is the volume variance. This variance represents the amount of difference between overheads absorbed on actual output and those on budgeted output. The under-or over-absorption of fixed overheads reflects that the concern did not operate at normal capacity. The major reasons for this variance are poor scheduling of production, improper use of labour, strikes, lockouts, power failures, etc. Volume variance is measured by multiplying the budgeted fixed overhead rate by the difference between the budgeted output and actual output. Thus,

Fixed overhead volume variance (FOVV) = (Standard output – Actual output) × Standard rate per unit

FOVV = (SOP – AOP) × SR

When the actual output is less than the standard output, the variance will be favourable and vice versa.

Illustration 8.17: From the following data calculate fixed overhead variances:

Budgeted fixed overhead	₹ 10,000
Actual fixed overheads	₹ 10,200

Budget output	5,000 units
Actual output	5,200 units
Budgeted hours	10,400 hours
Actual hours	10,050 hours

Solution

Fixed overhead variance (FOV) = (SFO – AFO)

FOV = ₹10,400* – 10,200

= ₹ 200 favourable

Fixed overhead expenditure variance (FOEXV) = (BFO – AFO)

FOEXV = ₹10,000 – 10,200

= ₹ 200 unfavourable

Fixed overhead volume variance (FOVV) = (SOP – AOP) × SR

FOVV = (5,000 – 5,200) × 2**

= 200 × 2

= ₹ 400 favourable

Verification

FOV = FOEXV + FOVV

₹ 200 (F) = ₹ 200 (UF) + ₹ 400 (F)

₹ 200 (F) = ₹ 200 (F)

Working:

$$\text{*Standard fixed overhead for actual production} = \frac{\text{Budgeted fixed overhead}}{\text{Budgeted output}} \times \text{Actual output}$$

$$= \frac{₹\,10{,}000}{5{,}000} \times 5{,}200$$

$$= ₹\,10{,}400$$

$$\text{**Standard rate per unit} = \frac{\text{Budgeted overhead}}{\text{Budgeted units}} = \frac{₹\,10{,}000}{5{,}000} = ₹\,2.00$$

Advance Variances: Fixed overhead volume variance can be further sub-divided into the following two variances:

Capacity Variance: This variance indicates whether the volume of production was more or less than normal. It represents the amount of variance that occurs because the actual activity level was different from the budgeted level. Capacity variance is similar to volume variance as both attempts to measure the actual activity. However, the difference between these two variances lies in the fact that the former measures actual activity with inputs and the latter measures actual activity in terms of outputs. The formula for computing this variance is:

$$\text{Capacity variance (FOCV)} = (\text{Budgeted units} - \text{Standard units*}) \times \text{Standard overhead rate}$$

$$\text{FOCV} = (\text{BU} \times \text{SU}) \times \text{SR}$$

NOTES

* Standard units means budgeted quantity to be produced during the actual hours worked. In other words it means production at standard rate during actual hours.

If the budgeted units are less than standard units, the variance is favourable and vice versa.

Efficiency Variance: Efficiency variance reveals the difference in fixed overhead cost as a result of using more or fewer hours than planned for the production volume. Such variance may be caused by efficient or inefficient use of the labour, machine, etc. This variance is computed by multiplying the budgeted fixed overhead rate by the difference between the actual and standard hours for actual production. Thus,

$$\text{Efficiency variance (FOEFV)} = (\text{Standard units} - \text{Actual units}) \times \text{Standard overhead rate}$$

$$\text{FOEFV} = (\text{SU} - \text{AU}) \times \text{SR}$$

If standard units are less than the actual units, the variance will be favourable and vice versa.

Illustration 8.18: Calculate sub-variances of fixed overhead volume variance from the cost data as given in Illustration 8.17.

Solution: In Illustration 18.17 the fixed overhead volume variance has been computed to ₹ 400 favourable which will be now verified by its sub-variances—capacity variance and efficiency variance.

Capacity variance (FOCV) = (BU – SU) × SR

FOCV = (5,000 – 4,832*) × 2 = 168 × 2 = ₹ 336 (unfavourable)

Efficiency variance (FOEFV) = (SU – AU) × SR

FOEFV = (4,832 – 5,200) × 2 = ₹ 736 favourable

Verification

FO volume variance = FO Capacity variance + FO efficiency variance

₹ 400 (F) = ₹ 336 (UF) + ₹ 736 (F)

₹ 400 (F) = ₹ 400 (F)

Working:

$$\text{*Standard units (SU)} = \frac{\text{Budgeted units}}{\text{Budgeted hours}} \times \text{Actual hour} = \frac{5,00}{10,400} \times 10,050 = 4,832 \text{ units}$$

In addition to the above discussed sub-variances of volume variance, one more variance known as *'Calendar variance'* (discussed below) is also sometimes calculated. This variance is calculated when the days actually worked differs from the budgeted days.

Calendar Variance: Calendar variance represents that portion of volume variance which arises due to the difference between actual number of working days and the number of working days in the budget. It is favourable if the actual working days are less than budgeted working days. This variance can be expressed as follows:

Calendar variance (FOCLV) = Budgeted units – Revised budgeted units × Standard overhead rate.

FOCLV = (BR – RBU)* × SR

where

BU = budgeted quantity

BH = budgeted hours

AH = actual hours

*RBU = (BU/BH) × AH

Note: With the incorporation of calendar variance in the volume variances, the formula for capacity variance also changes and stands as:

Capacity variance = (SU – RBU) × SR

Check Your Progress

4. What is labour efficiency variance?
5. Mention the formula for labour revised efficiency variance (LREV).
6. What are the sub-categories of variable overhead variance?
7. Define capacity variance.

8.6 PRACTICAL PROBLEMS

Problem 8.1: Compute material cost variance from the following cost data:

Standard quantity per product	= 4 units
Standard price per unit of raw material	= ₹ 3
Actual quantity for the total output	= 18,000 units
Actual price per unit	= ₹ 4
Output	= 5,000 units

Solution

Material cost variance = (Standard cost – Actual cost)

MCV = (SP × SQ) – (AQ × AQ)

= (3 × 20,000) – (4 × 18,000)

= 60,000 – 72,000

= ₹ 12,000 unfavourable

NOTES

Material price variance = (Standard price – Actual price) × Actual quantity

MPV = (SP – AP) × AQ

= (3 – 4) × 18,000

= 1 × 18,000

= ₹ 18,000 unfavourable

Material quantity variance = (Standard quantity – Actual quantity) × Standard price

MQV = (SQ – AQ) × SP

= (20,000 – 18,000) × 3

= 2,000 × 3 = ₹ 6,000 favourable

Verification

MCV = MPV + MQV

₹ 12,000 (UF) = ₹ 18,000 (UF) + ₹ 6,000 (F)

Problem 8.2: Super ESS Ltd., is engaged in the manufacturing of an articles using two grades of materials TUFF and SOFT. The following data are available from the company accounts:

Standard mixture:

Material TUFF 100 kg at ₹ 10 per kg

Material SOFT 150 kg at ₹ 20 per kg

Actual Mixture:

Material TUFF 120 kg at ₹ 12 per kg

Material SOFT 130 kg at ₹ 18 per kg

Calculate different material variances.

Solution

Material cost variance	=	(SQ × SP) – (AQ × AP)		
Material TUFF	=	(100 × 10) – (120 × 12)	=	440 (UF)
Material SOFT	=	(150 × 20) – (130 × 18)	=	660 (F)
Total (MCV)			=	₹ 220 (F)
Material price variance	=	(SP – AP) × (AQ)		
Material TUFF	=	(10 – 12) × 120	=	240 (UF)
Material SOFT	=	(20 – 18) × 130	=	260 (F)
Total (MPV)			=	₹ 20 (F)

Material usage variance = (SQ – AQ) × SP)

Material TUFF	= (100 – 120) × 10	=	200 (UF)
Material SOFT	= (150 – 130) × 20	=	400 (F)
Total (MUV)		=	₹ 200 (F)

NOTES

Verification

Material cost variance = Material price variance + Material usage variance

₹ 220 (F) = ₹ 20 (F) + 200 (F)

Material mix variance* = (RSQ1 – AQ) × SP

Material TUFF	= (100 – 120) × 10	=	200 (UF)
Material SOFT	= (150 – 130) × 20	=	400 (F)
Total (MMV) =			₹ 200

Working:

1. Calculation of revised standard quantity:

$$\text{Material TUFF} = \frac{100}{250} \times 250 = 100 \text{ units}$$

$$\text{Material SOFT} = \frac{150}{250} \times 250 = 100 \text{ units}$$

* In this illustration actual total quantity of material is 250 kg and also the total standard quantity to be used is 250 kg. But the actual composition of mix is different from that of standard mix. Therefore, it is obvious that the material usage variance is only due to material mix variance in this illustration. Accordingly material usage variance is equal to material mix variance and both amounts to ₹ 200 favourable.

Problem 8.3: A contract job was scheduled to be completed in 40 days by engaging 60 workers at an average wage rate of ₹ 60 per day. The work was completed in 55 days. 70 workers actually worked for all days on the job. The total wages paid for the job was ₹ 1,92,500. The workers did not work for 5 days due to shortage of raw material. Calculate appropriate labour variances.

Solution

Labour cost variance = (SH × SR) – (AH × AR)
= (2,400 × 60) – (3,850 × 50)
= 1,44,000 – 1,92,500
= ₹ 48,500 (UF)

Labour rate variance = (SR – AR) × AH
= (60 – 50) × 3,850
= 10 × 3,850
= ₹ 38,500 (F)

NOTES

Labour efficiency variance = (SH – AH) × SR
= (2,400 – 3,500) × 60
= 1,100 × 60
= ₹ 66,000 (UF)

Idle time variance = Idle hours × Standard hourly rate
= 350 × 60
= ₹ 21,000 (UF)

Verification

LCV = LRV + LEV + LITV

₹ 48,500 (UF) = ₹ 38,500 (F) = ₹ 66,000 (UF) + ₹ 21,000 (UF)

Problem 8.4: The standard labour composition and the actual labour composition engaged in 10 weeks for a job are as under:

Category of Workers	*Standard*		*Actual*	
	No. of Workers	*Weekly Wage Rate Workers (₹)*	*No. of Workers*	*Weekly Wage Rate Per Work-ers (₹)*
Grade A	40	80	50	70
Grade B	50	70	60	75
Grade C	30	50	10	60

The work is actually completed in 12 weeks. Calculate labour variances.

Solution

Labour cost variance = (SH × SR) – (AH × AR)

Grade A = (400* × 80) – (600** × 70) = 10,000 (UF)
Grade B = (500 × 70) – (720 × 75) = 19,000 (UF)
Grade C = (300 × 50) – (120 × 60) = 7,800 (UF)
Total (LCV) = ₹ 21,200 (UF)

Labour rate variance = (SR – AR) × AH

Grade A = (80 – 70) × 600 = 6,000 (F)
Grade B = (70 – 75) × 720 = 3,600 (UF)
Grade C = (50 – 60) × 120 = 1,200 (UF)
Total (LRV) = ₹ 1,200 (F)

Labour efficiency variance = (SH – AH) × SR

Grade A = (400 – 600) × 80 = 16,000 (UF)
Grade B = (500 – 720) × 70 = 15,400 (UF)
Grade C = (300 – 120) × 50 = 9,000 (F)
Total (LEV) = ₹ 22,400 (UF)

Labour mix variance = (RSH – AH) × SR

Grade A = (480 – 600) × 80	=	9,600 (UF)
Grade B = (600 – 720) × 70	=	8,400 (UF)
Grade C = (360 – 120) × 50	=	12,000 (F)
Total (LMV) =		₹ 6,000 (UF)

Labour revised efficiency variance = (SH – RSH) × SR

Grade A = (400 – 480) × 80	=	6,400 (UF)
Grade B = (500 – 600) × 70	=	7,000 (UF)
Grade C = (300 – 360) × 50	=	3,000 (UF)
Total (LREV) =		₹ 16,400 (UF)

Verification

LCV = LRV + LEV

₹ 21,200 (UF) = 1,200 (F) + ₹ 22,400 (UF)

LEV = LMV = LREV

₹ 22,400 (UF) = ₹ 6,000 (UF) + ₹ 16,400 (UF)

Working:

Calculation of revised standard hours

$$\text{Grad A} = \frac{400}{1,200} \times 1,440 = 480$$

$$\text{Grad B} = \frac{500}{1,200} \times 1,440 = 600$$

$$\text{Grad C} = \frac{300}{1,200} \times 1,440 = 360$$

Problem 8.5: Compute labour variance from the following data:

Actual variance overhead	₹ 9,000
Budgeted variance overhead	₹ 6,000
Budget output	15,000 units
Actual output	12,000 units
Budgeted hours	30,000
Actual hours	36,000

Solution

Variable overhead variance (VOC) = (SVO – AVO)

= (4,8001 – 9,000)

= ₹ 4,200 unfavourable

Variable overhead expenditure variance (VOEXV) = (SVO – AVO)

= (7,2002 – 9,000)

= ₹ 1,800 unfavourable

Variable overhead efficiency variance (VOEFV) = (SVOH – AVOH)

= (24,0003–36,000) × 0.20

= 2,400 unfavourable

Verification

VOC = VOEXV + VOEFV

4,200 (UF) = 1,800 (UF) + 2,400 (UF)

4,200 (UF) = 4,200 UF

Working:

1. Standard variable overhead (SVO) = Actual output × Standard variable overhead rate

   = ₹ 12,000 × 0.40*

   = ₹ 4,800

$$\text{*Standard variable overhead rate} = \frac{\text{Budgeted variable overhead}}{\text{Standard output}}$$

$$= \frac{₹6,000}{₹15,000}$$

= ₹ 0.40

2. Standard variable overhead = Actual hours × Standard variable overhead per hour

   = 36,000 × 0.20**

   = ₹ 7,200

$$\text{**Standard variable overhead per hour} = \frac{\text{Budgeted variable overhead}}{\text{Budgeted hours}}$$

$$= \frac{₹6,000}{₹30,000}$$

= ₹ 0.20

3. Standard labour hours for actual units produced $= \frac{\text{Budgeted hours}}{\text{Budgeted output}} \times \text{Actual output}$

$$= \frac{30,000}{15,000} \times 12,000$$

= 24,000 hours

NOTES

Problem 8.6: Standard hours for manufacturing two products M and N are 15 hours per unit and 20 hours per unit respectively. Both products require identical kind of labour and the standard wage rate per hour is ₹ 5. In a year 10,000 units of M and 15,000 units of N were manufactured. The total labour hours actually worked were 4,50,500 and the actual wage bill came to ₹ 23,00,000. This included 12,000 hours paid for @ ₹ 7 per hour and 9,400 hours paid for @ ₹ 7.50 per hour, the balance having been paid at ₹ 5 per hour. You are required to compute the labour variances.

(ICWA, Inter)

Solution

Labour cost variance = (Standard cost – Actual cost)

LCV = ₹ 22,50,000[1] – ₹ 23,00,000

= ₹ 50,000 (UF)

Labour efficiency variance = (Standard hours – Actual hours) × Standard rate

= (4,50,000 – 4,50,500) × 5

= ₹ 2,500 (UF)

Labour rate variance = (Standard rate – Actual rate) × Actual hours

= [(5 – 7) × 12,000] + [5 – 7.50) × 9,400] + [(5 – 5) × 4,29,100]

= ₹ 47,500 (UF)

Working:

1. *Calculation of standard cost*

Standard cost	=	(Standard hour × Standard rate)	
For product M	=	1,50,000 × 5 =	7,50,000
For product N	=	3,00,000 × 5 =	15,00,000
		Total = ₹	22,50,000

Problem 8.7: The following data is available in connection with the fixed overheads of a factory:

Budgeted fixed overhead for January	₹ 1,00,000
Budgeted output for January	50,000 units
Standard time for 1 unit	5 hours
Actual hours worked	2,55,000
Actual fixed overheads for the month	₹ 1,10,000
Unit produced during the month	52,000

Calculate fixed overhead variance for the month. (*M.Com., Madurai*)

NOTES

Solution

Fixed overhead variance (FOVO) = (Standard fixed overhead – Actual Fixed overheads)

= (1,04,0001 – 1,10,000)

= ₹ 6,000 (UF)

Fixed overhead expenditure variance (FOEXV) =

(Total Budgeted Fixed overhead – Total Actual Fixed overheads)

= (1,00,000 – 1,10,000)

= ₹ 10,000 (UF)

Fixed overhead volume variance (FOVV) = (Standard output – Actual output) × Standard rate per unit

= (50,000 – 52,000) × 22

= ₹ 4,000 (F)

Verification

FOV =FOEXV + FOVV

₹ 6,000 (UF) = ₹ 10,000 (UF) + 4,000 (F)

₹ 6,000 (UF) = ₹ 6,000 (UF)

Working:

1. $$\text{Standard fixed overheads for actual production} = \frac{\text{Budgeted fixed overheads}}{\text{Budgeted output}} \times \text{Actual output}$$

$$= \frac{1,00,000}{50,000} \times 52,000$$

= ₹ 1,04,000

2. $$\text{Standard rate per unit} = \frac{\text{Budgeted overheads}}{\text{Budgeted units}}$$

$$= \frac{₹1,00,000}{50,000}$$

= ₹ 2.00

8.7 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Favourable variances are when actual costs are less than the standard costs; and unfavourable variances are when actual costs exceed the standard costs.

2. The payment of lower price by purchasing department for a given quality would result in a favourable material price variance and thereby maintain the required standard.
3. The following is the formula for material yield variance:

   Material yield variance (MYV) = (Standard Yield- Actual Yield) × Standard Rate
4. Labour efficiency variance indicates the number of actual direct labour (in terms of hours) worked above or below the standard for the actual level of production at standard price.
5. The following is the formula for labour revised efficiency variance (LREV):

   Labour revised efficiency variance (LREV) =

   (Standard hour –Revised Standard hours) × Standard Rate
6. Variable overhead variance can be divided into two categories viz., variable overhead expenditure variance and variable overhead efficiency variance.
7. Capacity variance indicates whether the volume of production was more or less than normal. It represents the amount of variance that occurs because the actual activity level was different from the budgeted level.

8.8 SUMMARY

- A favorable variance is a business situation where actual costs are less than the standard costs; and
- An unfavorable variance refers to a situation in which actual costs exceeds the standard costs.
- Material cost variance represents the difference between the actual costs and the standard costs of material for a specified output.
- The material price variance attempts to measure the variance between the actual cost of material and the standard cost expected to be paid for the material.
- Material usage variance is deviation caused from the standard due to difference in quantities used. It indicates the actual quantity of direct materials used above or below. Material mix variance is that portion of the direct material usage variance which is due to the difference between the standard and actual composition of the mixture.
- Material Yield Variance is that portion of direct material usage variance which is due to the difference between the standard yield specified and the actual yield obtained.

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- Labour cost variance represents the difference between standard labour cost specified for the activity and the actual labour cost paid for the activity.
- Labour efficiency variance indicates the number of actual direct labour hours worked above or below the standard for the actual level of production at standard price.
- Labour rate variance represents the average of the actual hourly rates paid above or below.
- Labour revised efficiency variance represents the deviation between the standard labour hours specified for the activity achieved and the labour time spent for the same.
- Labour Yield Variance represents that potion of labour efficiency variance which is due to difference between the standard output and the actual output.
- Overhead variance represent the difference between the amount of overhead applied to production during the period and the amount of actual overhead cost incurred during the period.
- Variable overhead variance represents the difference between actual variable overheads and the specified variable overheads.
- Variable overhead expenditure variance is the difference between actual variable overhead expenditure and the standard variable overheads for the actual hours of operation.
- The Variable Overhead Efficiency Variance reveals the difference in variable overhead cost as a result of using more or fewer hours than set for the manufacture of the products.
- Fixed overhead variance represents the amount of variation between the standard fixed overheads for specified production and actual fixed overheads.
- Fixed overhead expenditure represents the amount of difference between the budgeted and actual totals for fixed overhead costs.
- Fixed overhead volume variance represents the amount of difference between overheads absorbed on actual output and those on budgeted output.
- Capacity variance indicates that the volume of production was more or less than normal.
- Efficiency Variance reveals the difference in fixed overhead cost as a result of using more or fewer hours than planned for the production volume.

NOTES

8.9 KEY WORDS

- **Variance analysis:** It is a systematic process which analyses and interprets the variances.
- **Material variances:** It is difference between the standards set for cost of obtaining materials and for the quantities to be used in production and the actual costs incurred.
- **Labour variance:** It is determined by comparing predetermined labour standards with actual cost of productive labour.
- **Overhead variance:** It represents the difference between the amount of overhead applied to production during the period and the amount of actual overhead cost incurred during the period.

8.10 SELF ASSESSMENT QUESTIONS AND EXERCISE

Short-Answer Question

1. Distinguish between
   (a) Material price variance and material mix variance; and
   (b) Labour efficient variance and labour rate variance.
2. Define the term Zero variance. Describe the managerial uses of variance analysis.
3. Explain in brief the accounting treatment and disposition of variances.
4. List the causes for material price and usage variance.

Long-Answer Question

1. What is variance analysis? Explain and illustrate the various types of material variances.
2. A company manufactured 12,000 units during the year 2000 by consuming 36,000 kg of raw material which was purchased at ₹ 3 per kg. The engineering section of the company had estimated 2 kg of raw material for a unit output. The standard price of the raw material was fixed for ₹ 3.50 per kg. Calculate material variances.
3. The following standard and actual data pertain to Suba Ltd.

   Standard

   Material X—20 kg at ₹ 3 per kg

   Material Y—30 kg at ₹ 4 per kg

   Normal process loss is 10 per cent of input

NOTES

Actual

Material X—300 kg at ₹ 3 per kg

Material Y—200 kg at ₹ 3 per kg

Actual loss was 15 per cent on input and output 350 units. Compute Material cost variances.

4. Following information has been taken from the records of a manufacturing concern. Calculate material variances.

	Standard		*Actual*	
	Qty. (Kg)	*Rate (₹)*	*Qty. (Kg)*	*Rate (₹)*
Material X	60	5.00	70	4.50
Material Y	40	3.00	30	4.00
Input	100		100	
Loss	10		9	
Output	90		91	

5. The standard and actual labour force required for completing a job taking four weeks periods is given as follows:

Category	*Standard*		*Actual*	
	No. of Workers	*Weekly Rate (₹)*	*No. of Workers*	*Weekly Rate (₹)*
Men workers	50	30	45	32
Women workers	40	30	48	33

Calculate

(i) Labour cost variance

(ii) Labour rate variance

(iii) Labour efficiency variance.

6. The standard cost for a product is:

Time 10 hours per unit,

Cost ₹ 5 per hour

The actual performance was:

Production	1,000 units
Hours taken for production	10,400 hours
Idle time	400 hours
Total time	10,800 hours

Payment made ₹ 56,160 @ ₹ 5.20 per hour. Calculate labour variance.

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7. The following data are taken from the books of Everest Company Ltd.

   Standard

   Material X, 50 units at ₹ 4 per unit

   Material Y, 40 units at ₹ 3 per unit

   200 Men @ ₹ 2 per hour for 50 hours

   130 Women @ ₹ 1 per hour for 40 hours

   Normal loss, 10 units

   Actual

   Material X, 52 units at ₹ 3.50 per unit

   Material Y, 36 units at ₹ 3.50 per unit

   210 Men @ ₹ 2 per hour for 65 hours

   100 Women @ ₹ 0.75 per hour for 45 hours

   Actual loss, 7 units

   Calculate material and labour variances.

8. From the following details, compute the different overhead variances:

Budgeted variable costs	₹	20,000
(for 80,000 direct labour hours)		
Budget fixed costs	₹	40,000
Normal activity (director labour hour)		80,000
Actual hours worked		22,000
Standard hours		20,000
Actual variable overhead costs incurred	₹	5,100
Actual fixed overhead costs incurred	₹	9,800

9. The standard output per week in a factory is 4,000 units but the actual output for the week was, 4,800 units. The total overhead expenses for the period were as follows:

	Actual **(₹)**	***Budget*** **(₹)**
Fixed	1,800	1,600
Variable	1,000	1,000
Semi-variable	2,100	1,800

   The overtime work done during the week was equal to one day's work. Semi-variable expenses are one-third fixed and two-third variable. Find out the different variances.

10. Double Beauty Manufactures Ltd. has given the following budgeted and actual figures:

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Budget	₹
Sales – 4,000 units @ ₹10 each	40,000
Cost of sales @ ₹ 7 each	28,0 00
Profit	12,000
Actual	
Sales – 4,500 units @ ₹ 9 each	40,500
Cost of sales @ ₹ 6 each	27,000
Profit	13,500

Calculate the variances in respect of profit, sale and cost of sales.

8.11 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

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BLOCK - III
COSTING AND ITS APPLICATIONS

UNIT 9 MARGINAL COSTING, CVP ANALYSIS AND BREAK EVEN ANALYSIS

Structure

9.0 Introduction
9.1 Objectives
9.2 Concept of Marginal Costing
 9.2.1 Advantages and Disadvantages of Marginal Costing
 9.2.2 Contribution
 9.2.3 Marginal Cost Equation
 9.2.4 Profit/Volume Ratio (P/V Ratio)
9.3 Managerial Application of Marginal Costing
9.4 CVP Analysis And Break Even Analysis
9.5 Answers to Check Your Progress Questions
9.6 Summary
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9.9 Further Readings

9.0 INTRODUCTION

To make optimum use of the output capacity, the manufacturing organizations are frequently confronted with the decision of additional output as long as they operate below their output capacity. Since this decision involves additional cost, therefore, the organizations need to analyse and understand the behaviour of additional costs before arriving at such a decision. Such an understanding is essential because every increase in the level of output would not increase profits rather would diminish the organization's marginal profit if the organization is already operating at the optimum level of its existing output capacity. However, such a decision would definitely prove financially sound if the organization has any unutilized output capacity. Consequently, the management needs to possess knowledge about the behaviour of costs as a result of a change in the level of output in order to arrive at an accurate decision. It is in this context an attempt has been made in this chapter to identify and examine the impact of change in the level of output on cost and business result.

9.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning of marginal costing
- Describe the advantages, limitations and managerial uses of marginal costing
- Discuss CVP analysis and Break even analysis

9.2 CONCEPT OF MARGINAL COSTING

In this section, you will learn about the concept, advantages and limitations of marginal costing.

Cost Behaviour

The analysis of cost behaviour reveals that the cost of a product can be divided into two major categories:

- fixed cost; and
- variable cost

As per cost behaviour, fixed cost remains constant to a particular level of output whereas variable cost has the tendency to change proportionately with the volume of output. The example given below will clarify the concept further.

Example: Suba Company Limited sold 2,000 units @ ₹ 100 per unit during the year 2011–12 with the following details of production expenditure:

(i) Wages ₹ 20 per unit.

(ii) Rent of factory ₹ 5000 per annum.

(iii) Salary of executive ₹ 50,000 per annum.

(iv) Raw material required to produce one unit of finished product 2 kg @ ₹ 2 per kg.

In the above-mentioned example, the costs of raw material and wages must have changed proportionately with the change in the level of output, and therefore, they fall within the scope of variable costs whereas the rent of factory and salary of executive must have remained unchanged despite the change in output. In fact, they must have remained constant at every level of output and as such fall within the scope of fixed costs. On account of this reason, it is not logical to apportion fixed costs to production in case of any additional output. Marginal costing is the technique which deals with this phenomenon.

Marginal Cost

The cost of one additional unit of output is known as marginal cost. In other words, it refers to the cost that is incurred by a business to move from output level ‘n’ to ‘n + 1’. According to terminology of cost accountancy of the Institute of Cost and Management Accountants, 1974, Marginal cost is the amount of any given volume of output by which aggregate costs are changed if the volume of output is increased by one unit. Blocker and Weltmore, 1972, defines marginal cost as the increase or decrease in total cost which results from production or selling additional or fewer units of a product or form a change in the method of production or distribution such as the use of improved machinery, addition or exclusion of a product or territory, or selection of an additional sales channel. Thus, marginal cost is the cost incurred by a business for the additional output.

Marginal Costing

Marginal costing is an accounting technique which ascertains marginal cost of additional output by differentiating between fixed and variable costs. This technique aims to charge only those costs to the cost of additional product that vary directly with sales volumes. Those costs would be direct material, direct labour and factory overhead expenses like supplies and some indirect labour and power. The cost of the additional product would not include fixed or non-variable expenses such as depreciation, factory insurance, taxes and supervisory salaries.

Marginal costing is defined by the National Association of Accountants, 1961, London, as a method which proposes that fixed expenses be classified as period expenses and be written off currently as is generally done with selling and administration expenses, and that only the variable costs become the basis of inventory value and profit determination.

According to the Institute of Cost and Management Accountants, marginal costing is the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs... In this technique of costing only variable costs are charged to operations, process or products, leaving all indirect costs to be written off against profits in the period in which they arise.

To the author of this book, marginal costing is a costing technique that considers only the costs that vary directly with volume—direct materials, direct labour and variable factory overheads and ignores fixed cost in additional output decisions. Thus, the technique of marginal costing lies in

- differentiation between fixed and variable costs;
- ascertainment of marginal costs; and
- finding out effect on profit due to change in volume or type of output.

Characteristics of Marginal Costing

Marginal costing reveals the following four features:

- ***Method of Recording and Reporting*: **Marginal costing is a method of recording as well as reporting costs. Unlike differential cost analysis and break-even analysis which utilize traditional records, marginal costing requires a unique method of recording cost transactions as they originally take place.
- ***Separation of Costs into Fixed and Variable Elements*: **Under marginal costing, all types of operating costs (factory, selling and administrative) are separated into fixed and variable components and are recorded separately.
- ***Variable Costs Applied to Product*: **Variable cost elements are recognized as product costs, i.e., they are charged to the product at the appropriate movements and follow the product through the inventory accounts, and thus are treated as expenses when the product is sold. Variable distribution costs normally are chargeable to product at or near the moment of sale, and thus do no become part of the inventory values.
- ***Fixed Cost Written Off as Period Cost*: **Fixed costs (including fixed factory overheads) are handled as period costs, i.e., they are written off as expenses in the period in which they are incurred. They do not follow the inventories through the accounts but rather are treated in a way which is traditionally for selling and general administrative expenses.

From the above discussion, it is clear that marginal costing is not a system of cost ascertainment-like job, operating or process costing but is a technique to deal with the effect on profits as a result of changes in volume or type of output. It may be incorporated into the system of recording and collecting costs or it may be used as an analytical tool for studying and reporting the effects of changes in volume and type of output. Where it is incorporated into the system of recording and collecting costs, the stocks are valued at variable costs, and fixed costs are treated as period costs in profit statements.

Concept of Absorption Costing

Absorption costing is a system of costing that recognizes all costs including fixed ones as product costs, and therefore, considers all of them in ascertaining the cost of the product. Since the costing system does differentiate between variable and fixed costs, it charges the full costs to a product irrespective of the

fact whether such costs are relevant to the product. Thus, absorption costing promotes the philosophy of charging all types of costs—fixed, variable, direct and indirect to processes, operations or products. Although this system of costing has been criticized by many scholars on the plea that it fails to report inventories of the business at a genuine value, yet it is preferred by many business firms even today.

Marginal Costing vs. Absorption Costing

The two major differences between marginal costing and absorption costing are summarized below:

- In marginal costing the product is charged only with those costs that are directly affected by changes in volume. Under the absorption costing method period costs (fixed costs) which are a function of time and, therefore, are not affected by volume changes, are also charged to the cost of production.
- Under the absorption costing method, inventories will normally be reported at a higher figure than the marginal costing method. This is due to the fact that fixed costs, under the absorption method, are deferred by being included in the cost of goods inventory. The element of fixed cost will not be reported as a deduction from revenue until the goods are sold and then it is shown as expense in the cost of goods sold in the income statement. Under the marginal cost method, no fixed costs are deferred; they are charged against revenue in the period in which they are incurred. Illustration 9.1 would clearly demonstrate the difference between these two methods.

Illustration 9.1: From the following data prepare statements of cost according to both absorption costing and marginal costing system:

Particulars	*Product X* (₹)	*Product Y* (₹)
Sales	15,000	40,000
Direct material	6,000	18,000
Direct labour	4,000	7,000
Factory overheads:		
Fixed	3,000	3,000
Variable	1,000	2,500
Administrative overheads:		
Fixed	500	1,000
Selling overheads:		
Fixed	1,000	1,500
Variable	500	1,500

Solution

Statement of Cost and Profit (Absorption Costing)

Particulars	*Product* X (₹)	*Product* Y (₹)	Total (₹)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Factory overheads	4,000	5,500	9,500
Administrative overheads	500	1,000	1,500
Selling overheads	1,500	3,000	4,500
Total Cost (B)	16,000	34,500	50,500
Net Profit (A – B)	(–) 1,000	5,500	4,500

Statement of Cost (Marginal Costing)

Particulars	*Product* X (₹)	*Product* Y (₹)	Total (₹)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Variable factory overheads	1,000	2,500	3,500
Variable selling overheads	500	1,500	2,000
Total (B)	11,500	29,000	40,500
Contribution (A – B)	3,500	11,000	14,500
Less: Fixed Cost			
(Factory, Administrative and Selling)	4,500	5,500	10,000
Net Profit	(–) 1,000	5,500	4,500

Sometimes fixed costs are not traceable to different products, then the statement of cost will be prepared after contribution margin as under:

Statement of Cost (Marginal Costing)

Particulars	*Product* X (₹)	*Product* Y (₹)	Total (₹)
Sales (A)	15,000	40,000	55,000
Less: Cost of Sales:			
Direct material	6,000	18,000	24,000
Direct labour	4,000	7,000	11,000
Variable factory overheads	1,000	2,500	3,500
Variable selling overheads	500	1,500	2,000
Total (B)	11,500	29,000	40,500
Contribution (A – B)	3,500	11,000	14,500
Less: Fixed Cost			
(Factory Administrative and Selling)	–	–	10,000
Net Profit			4,500

9.2.1 Advantages and Disadvantages of Marginal Costing

According to the National Association of Accountants, marginal costing has the following advantages and disadvantages:

Advantages

- Cost–volume–profit relationship data required for profit planning purposes are readily obtained from the regular accounting statements. Hence, management does not have to work with two separate sets of data to relate one to the other.
- The profit for a period is not affected by changes in absorption of fixed expenses resulting from building or reducing inventory. Other things remaining equal (e.g., setting prices, costs, sales mix) profits move in the same direction as sales when marginal costing is in use.
- Manufacturing cost and income statements in the marginal cost form follow management's thinking more closely than does the absorption cost form for these statements. For this reason, management finds it easier to understand and to use marginal cost reports.
- The impact of fixed costs on profits is emphasized because the total amount of such cost for the period appears in the income statement.
- Marginal income figures facilitate relative appraisal of products, territories, classes of customers and other segments of the business without having the result obscured by allocation of joint fixed costs.
- Marginal costing ties in with such effective plans for cost control as standard costs and flexible budgets. In fact, flexible budget is an aspect of marginal costing and many companies thus use marginal costing methods for this purpose without recognizing them as such.
- Marginal cost constitutes a concept of inventory cost which corresponds closely with the current out-of-pocket expenditure necessary to manufacture the goods.

Disadvantages

- Difficulty may be encountered in distinguishing fixed costs. In particular, certain semi-variable costs may fall in a border-line area and more or less arbitrary classification may be considered necessary in order to arrive at a practical determination of fixed and variable components.
- Complete manufacturing cost is not determined in the process of costing production and supplementary allocation of fixed overheads on normal or some other volume base must be made to provide product costs for long-range pricing and other long-range policy decisions.

- Serious taxation problems may be encountered if a change is made from full cost to marginal cost for costing inventory and definite rulings are not available for guidance.

9.2.2 Contribution

Contribution which is recognized as a strategic tool for managerial decision making represents the difference between product revenue and variable cost of product. According to Bigg, 1973, contribution may be defined as the difference between sales value and the marginal cost of sales, and no net profit arises until the contribution equals the fixed overheads. When this level of output is achieved, the business is said to break-even as neither profit nor loss occurs. Production in excess of that necessary to break-even will result in a profit equivalent to the excess units multiplied by the 'contribution' per unit. Conversely, a loss is sustained if output is less than that required to break-even, amounting to the shortfall of units multiplied by the contribution. Thus, contribution is the difference between the marginal cost of the various products manufactured and their respective selling price. Since contribution represents the excess of sales over marginal cost (variable cost) of the goods sold, the resultant figure refers to the amount to meet fixed cost and expected profit of an organization. It can be calculated as under:

(i) Contribution = Sales – Variable Cost

OR

Contribution (per unit) = Selling price per unit – Variable cost per unit

(ii) Contribution = Fixed cost + Profit/loss

Example: Suppose total sales revenue is ₹ 50,000, variable cost is ₹ 20,000 and sale in terms of units is 1,000 then contribution will be:

Contribution = ₹ 50,000 – ₹ 20,000 = ₹ 30,000

OR

Contribution (per unit) = 50 – 20 = ₹ 30

9.2.3 Marginal Cost Equation

The analysis of marginal cost statement and the contribution mentioned above reveals that

(i) Sales – Marginal cost = Contribution (i)

(ii) Fixed cost + Profit = Contribution (ii)

By combining the above two equation, we get fundamental marginal cost equation:

Sales – Marginal Cost = Fixed Cost ± Profit/Loss

or $S - V = F \pm P/L$

The marginal cost equation has practical utility in the sense that if the values of any three elements of the above equation are known, the fourth can be easily computed.

Illustration 9.2: Compute the amount of fixed cost from the information given below:

Sales	₹ 80,000
Variable cost	₹ 40,000
Profit	₹ 20,000

Solution: As per marginal cost equation

$$S - V = FC + P/L$$

substitute the value, we get:

$$₹\ 80{,}000 - ₹\ 40{,}000 = FC + ₹\ 20{,}000$$
$$₹\ 40{,}000 = FC + ₹\ 20{,}000$$
$$(-)\ FC = ₹\ 20{,}000 - ₹\ 40{,}000$$
$$(-)\ FC = (-)\ ₹\ 20{,}000$$
$$FC = ₹\ 20{,}000$$

9.2.4 Profit/Volume Ratio (P/V Ratio)

The profit/volume ratio also known as 'contribution ratio' or 'marginal ratio' expresses the relationship between contribution and sales. In other words, it is the contribution per rupee of sales. The P/V ratio can be expressed as under:

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

or $\text{Sales} = \frac{\text{Contribution (FC+Profit)}}{\text{P / V ratio}}$ or Contribution = Sales × P/V ratio

Since contribution is equal to sales minus (–) variable cost and also represent the amount of fixed cost and profit expectations, therefore, P/V ratio can also be expressed as

(i) $\text{P/V ratio} = \frac{\text{Sales} - \text{Variable cost}}{\text{Sales}} = \frac{S - V}{S}$

(ii) $\text{P/V ratio} = \frac{\text{Fixed cost} + \text{Profit}}{\text{Sales}} = \frac{F + P}{S}$

As discussed earlier, the fixed cost remains constant in the short-term period, therefore, any increase in contribution after the recovery of fixed cost would result straightway in the increase of profit. Thus,

$$\text{P/V ratio} = \frac{\text{Change in profit or Contribution}}{\text{Change in sales}}$$

Illustration 9.3: Compute (i) P/V ratio, (ii) Fixed cost, and (iii) Sales volume to earn a profit of ₹ 5,000 from the following information:

Sales = ₹ 50,000
Profit = ₹ 5,000
Variable cost = 80%

Solution:

Sales = ₹ 50,000
Variable cost = 80%

or $\frac{80}{100} \times 50,000 = ₹40,000$

(i) $\text{P/V ratio} = \frac{S - V}{S} \times 100$

$= \frac{50,000 - 40,000}{50,000} \times 100 = 20\%$

(ii) Contribution = FC + P
10,000 = FC + 5,000
(–) FC = 5,000 – 10,000
(–) FC = (–) 5,000
FC = ₹ 5,000

(iii) $\text{Sales} = \frac{FC + P}{P / V \text{ ratio}} = \frac{50,000 - 5,000}{20} \times 100 = ₹50,000$

Proof:

Sales	=	₹ 50,000
Less: VC (80%)	=	₹ 40,000
Contribution	=	₹ 10,000
Less: FC	=	₹ 5,000
Profit	=	₹ 5,000

Illustration 9.4: Assuming that the cost structure and selling prices remain the same in period (i) and (ii), find out the P/V ratio

Periods	*Sales* (₹)	*Total Cost* (₹)
I	1,40,000	1,25,000
II	1,60,000	1,40,000

Solution

Periods	*Sales* (₹)	*Total Cost* (₹)	*Profit* (₹)
I	1,40,000	1,25,000	15,000
II	1,60,000	1,40,000	20,000

$$\text{P/V ratio} = \frac{\text{Change in profit}}{\text{Change in sales}} \times 100 = \frac{5,000}{20,000} \times 100 = 25\%$$

Check Your Progress

1. How are fixed costs treated in marginal costing?
2. State the fundamental marginal cost equation.
3. What is marginal ratio?

9.3 MANAGERIAL APPLICATION OF MARGINAL COSTING

Decision making is a regular phenomenon of any business. One of the important factors that influence managerial decisions is the relevant costs that the managers need to identify and analyse to take the right decisions. The decision criteria most often used for the purpose generally include cost minimization, profit maximization and contribution maximization. In this direction, marginal costing is recognized as an effective tool and as such managers prefer to use this technique in the following areas of managerial problems:

- pricing decision
- production expansion decision
- make or buy decision
- scarce resources decision
- sales mix decision

Pricing Decision

Pricing decision has been a serious challenge for the managers as the same is being considered an important contributor to the success of a firm's market strategy. The most recommended approaches for price determination are the interaction of supply and demand and the cost of production but both fail to provide a complete explanation of the problem. However, in actual practice the short-term and long-term views of pricing may well be different; the nature and degree of competition varies from period to period, and demand positions also do not remain constant, therefore, the use of a single criteria for price determination may not be effective. However, marginal costing is an useful tool to deal with a challenging decision. Consequently, managers often use this technique to determine the price of a product. However, the pricing decision becomes more complicated when a product is to be sold in more than one market.

Illustration 9.5**:** Electro Electronics Ltd., deals in electric goods and submits the following information in respect of the goods manufactured by it.

Selling price per unit	₹ 5.00
Variable cost per unit	₹ 2.00

Fixed overheads ₹ 75,000

Units produced ₹ 75,000

The company is expected to reduce the selling price in order to meet the competition. You are requested to calculate the level of output to maintain present level of profit if the proposed reduction in prices is 10 per cent and 20 per cent.

***Solution*:**

Marginal Cost Statement

No. of Units 75,000

	Present Price (₹)	***Price Reduction***		
		10% (₹)	**15%** (₹)	**20%** (₹)
Sales	3,75,000	3,37,500	3,18,750	3,00,000
Less: Marginal cost	1,50,000	1,50,000	1,50,000	1,50,000
Contribution	2,25,000	1,87,500	1,68,750	1,50,000
Less: Fixed cost	75,000	75,000	75,000	75,000
Profit	1,50,000	1,12,500	93,750	75,000
Contribution per unit	3.00	2.50	2.25	2.00

Profit to be maintained ₹ 1,50,000
(Desired profit)

Contribution to be earned = Desired profit + Fixed cost
= ₹ 1,50,000 + ₹ 75,000 = ₹ 2,25,000

Number of units required to be sold at different levels of price reduction

$$= \frac{\text{Total contribution to be earned}}{\text{Contribution per unit}}$$

Hence

At 10 per cent reduction = $\frac{₹\ 2,25,000}{₹\ 2.50}$ = 90,000 units

At 15 per cent reduction = $\frac{₹2,25,000}{₹2.25}$ = 1,00,000 units

At 20 per cent reduction = $\frac{₹2,25,000}{₹2.00}$ = 1,12,500 units

Production Expansion Decision

The most common decision faced by managers in the growth of the business is to decide about the expansion of production. Opportunities to increase sales volume sometimes arise under circumstances that differ slightly from the normal marketing pattern. Most often business firms receive special order for the supply of bulk quantity of goods at a price below the market price of the firm's product. If this special transaction does not affect normal sales,

the decision to accept or reject the order largely depends on whether the transaction results in the amount of contribution in excess of the incremental costs that it generates. Thus, the offer shall be normally accepted at any price above the marginal cost (variable cost) because the additional output will not require any additional amount of fixed cost. As said earlier, this would mean the amount of contribution from additional sales results in the generation of profit.

Illustration 9.6: Papee Private Limited receives a special order from Sabee Private Limited for supply of 50,000 units of a product that usually sells for ₹ 10 per unit. Sabee Pvt. Ltd. offers ₹ 9 per unit for this product. Papee Pvt. Ltd. incurs ₹ 6 per unit in variable costs to manufacture each item, plus ₹ 2 per unit for variable administrative cost. Total fixed manufacturing costs are ₹ 3,00,000. Other fixed cost amounts to ₹ 1,50,000 per year. Productivity capacity is 4,00,000 units annually and sales volume through normal sales outlets will be about 3,00,000 units of this year.

Write a short report on the advisability or otherwise of accepting the offer.

Solution:

Marginal Cost Statement

Particulars	*Per Unit* (₹)	*Current Year Capacity 3,00,000 Units* (₹)	*Proposed Additional Output 50,000 Units* (₹)	*Total Capacity 100% 4,00,000 Units* (₹)
Sales	10.00	30,00,000	4,50,000	40,00,000
Less: Marginal cost:				
Variable cost	6.00	18,00,000	3,00,000	24,00,000
Variable Admn. cost	2.00	6,00,000	1,00,000	8,00,000
	8.00	24,00,000	4,00,000	32,00,000
Contribution	2.00	6,00,000	50,000	8,00,000
Fixed cost		4,50,000		4,50,000
Profit/Loss		1,50,000	50,000	3,50,000

Comments

If the order is accepted, revenues will increase by ₹ 4,50,000 (₹ 9 × 50,000). The incremental costs will only be ₹ 4,00,000 (8 × 50,000) – the variable cost of producing the extra units. Therefore, the company will gain ₹ 50,000 (4,50,000 – ₹ 4,00,000) by accepting the special order.

Make or Buy Decisions

Companies frequently receive proposals from the manufacturers wherein they claim that they could supply products that are currently being manufactured within the company at a price below the company's own cost. This is a regular

problem faced by management. This decision, from the financial point of view, requires accurate calculations that involve the concepts of differential costing and opportunity cost. This problem can be solved with the help of incremental analysis as is clear from Illustration 9.7.

***llustration 9.7*:** In its manufacturing operations, Shabnum Co. Ltd., uses a component 'ESS' that can be purchased from a supplier for ₹ 20 per unit. The same component 'ESS' is manufactured by Shabnum Co. Ltd., at the following unit cost:

Direct material	₹ 5.00
Direct labour	₹ 6.00
Variable overheads (125% of Direct labour)	₹ 7.50
Fixed overhead (75% of Direct labour)	₹ 4.50
Total unit cost	₹ 23.00

Give your suggestion whether to make or buy this component.

Solution: If the component 'ESS' is purchased it will cost ₹ 20 per unit. However, the purchasing cost should not always be compared with the full cost of internal manufacture, which amounts to ₹ 23. For short run decision making purposes, fixed overheads will remain constant regardless of the alternative chosen. Therefore, the outside purchase price should be compared only with internal manufacturing costs that can be avoided if the outside purchase is made. These avoidable cost include:

Direct material	=	₹ 5.00
Direct labour	=	₹ 6.00
Variable overheads	=	₹ 7.50
Total avoidable costs (per unit)	=	₹ 18.50

Thus, total avoidable costs of ₹ 18.50 per unit is less than the ₹ 20 outside purchase price. Therefore, it is suggested that Shabnum Company Ltd. should continue to manufacture the components 'ESS'.

Scarce Resources Decisions

The manufacturers often face a situation in which certain factors of production are scarce which affects the normal volume of output of the business. In such a situation, the management not only needs to use resources as profitably as possible but also give priority to those products which are the most profitable ones. To attain this objective, managers must relate profitability with the scarce factor of production as they would help them to sell those products that yield the highest profit per unit of the scarce factor. In this connection incremental analysis can be helpful for them to allocate resources that are limited in quantity or in productivity. However, managers need to compare alternative courses of action in a way that takes into account the availability of the resources. The profitability of various alternatives under the conditions of scarce resources is worked out with the help of following ratio:

$$\text{Profitabillity} = \frac{\text{Contribution}}{\text{Key factor}}$$

Illustration 9.8: M/s MAS Limited manufactures three rubber products using the same rubber compound. The suppliers of the compound informed the company that the supply of the compound would be cut by 25 per cent. The information about cost of the three products is as under:

Cost Per Unit	A (₹)	B (₹)	C (₹)
Direct material	200	75	100
Direct wages	50	200	200
Variable overheads	100	400	400
Fixed overheads	300	125	150
Total cost	650	800	850
Selling price per unit	1,100	900	900
Units produced	4,000	1,500	1,000

You are required to advise the company on the priorities of the product when material is a limiting factor.

Solution: The priorities of the product can be fixed on the basis of Contribution–Material Cost Ratio:

Particulars	A (₹)	B (₹)	C (₹)
Selling Price per unit	1,100	900	900
Less: Variable cost:			
Direct material	200	75	100
Direct wages	50	200	200
Variable overheads	100	400	400
Marginal Cost	350	675	700
Contribution	750	225	200
Contribution/Material Cost ratio (%)	375	300	200

Production priority A, B, and C

If production capacity is limited for any commodity the priority will be limited to such commodity to the extent of the capacity.

Sales Mix Decision

A diversified company with its large product line can use marginal costing techniques to decide about appropriate sales mix.

Illustration 9.9: Diamond Pvt. Limited submits the following information of costs in respect of its two products.

Particular	*Alfa Per Unit*	*Beta Per Unit*
Direct material	₹ 25	₹ 30
Direct wages	₹ 15	₹ 20
Variable overheads	₹ 15	₹ 20
Fixed overheads	₹ 15,000 per annum	
Selling price	₹ 75	₹ 125

You are required to recommend the management the profitable sales mix from the below mentioned alternatives:

(a) 300 units of Alfa, and 200 units of Beta
(b) 600 units of Alfa
(c) 800 units of Beta
(d) 100 units of Alfa and 300 units of Beta

Solution

Marginal Cost Statement

Particulars	***Alfa*** (₹)	***Beta*** (₹)
Selling price per unit	75	125
Less: Variable cost:		
Direct Material	25	30
Direct Wages	15	20
Variable overheads	15	20
Marginal cost	55	70
Contribution	20	55

Statement of Sales Mixtures

Particulars	***Alfa*** (₹)	***Beta*** (₹)	***Total*** (₹)
(a) 300 units of Alfa and 200 units of Beta			
Contribution:	6,000	11,000	17,000
Alfa: (300 × 20)			
Beta: (200 × 55)			
Less: Fixed overheads			15,000
Profit			2,000
(b) 600 units of Alfa			
Contribution (600 × 20)	12,000		12,000
Less: Fixed overheads			15,000
Profit			(–)3,000
(c) 800 units of Beta			
Contribution (800 × 55)		44,000	44,000
Less: Fixed overheads			15,000
Profit			29,000
(d) 100 units of Alfa and 300 units of Beta			
Contribution			
Alfa: (100 × 20)			
Beta: (300 × 55)	2,000	16,500	18,500
Less: Fixed cost			15,000
Profit			3,500

9.4 CVP ANALYSIS AND BREAK EVEN ANALYSIS

Cost-volume-profit analysis (CVP analysis) is an extension of the principles of marginal costing. It studies the interrelationship of three basic factors of business operations:

(a) Cost of production

(b) Volume of production/sales

(c) Profit

These three factors are interconnected in such a way that they act and react on one another because of cause and effect relationship amongst them. The cost of a product determines its selling price and the selling price determines the level of profit. The selling price also affects the volume of sales which directly affects the volume of production and volume of production in turn influences cost. In brief, variations in volume of production results in changes in cost and profit. CIMA London has defined CVP analysis as, 'the study of the effects on future profits of changes in fixed cost, variable cost, sales price, quantity and mix.'

An understanding of CVP analysis is extremely useful to management in budgeting and profit planning. It explains the impact of the following on the net profit:

(a) Changes in selling prices

(b) Changes in volume of sales

(c) Changes in variable cost

(d) Changes in fixed cost

In fact, CVP analysis helps in determining the probable effect of change in any one of these factors on the remaining factors.

Break-even Analysis

Break-even analysis is a widely-used technique to study the CVP relationship. It is interpreted in narrow as well as broad sense.

In its narrow sense, break-even analysis is concerned with determining break-even point, i.e., that level of production and sales where there is no profit and no loss. At this point total cost is equal to total sales revenue.

When used in broad sense, break-even analysis is used to determine probable profit/loss at any given level of production/sales. It is also used to determine the amount of sales to earn a desired amount of profit.

Check Your Progress

4. Mention the decision criteria most often used for decision making in an organization.
5. How is the profitability of various alternative under the conditions of scarce resource worked out?
6. List the elements whose impact on the net profit is revealed by the CVP analysis.

9.5 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. Fixed costs are handles as period costs, i.e., they are written off as expenses in the period in which they are incurred. They do not follow the inventories through the accounts but rather are treated in a way which is traditionally for selling and general administrative expenses.
2. The following is the fundamental marginal cost equation:

   Sales – Marginal Cost = Fixed Cost ± Profit/Loss
3. The profit/volume ratio also known as 'contribution ratio' or 'marginal ratio' expresses the relationship between contribution and sales. In other words, it is the contribution per rupee of sales.
4. The decision criteria most often used for decision making in an organization include cots minimization, profit maximization and contribution maximization.
5. The profitability of various alternative under the conditions of scarce resource worked out with the help of following ratio:

   $$\text{Profitability} = \frac{\text{Contribution}}{\text{Key Factor}}$$
6. CVP analysis is extremely useful to management in budgeting and profit planning. It explains the impact of the following on the net profit:
   (a) Changes in selling prices
   (b) Changes in volume of sales
   (c) Changes in variable cost
   (d) Changes in fixed cost

9.6 SUMMARY

- Fixed cost remains constant to a particular level of output whereas variable cost has the tendency to change proportionately with the volume of output.

- Marginal cost is the increase or decrease in total cost which results from production or selling additional or fewer units of a product or form a change in the method of production or distribution such as the use of improved machinery, addition or exclusion of a product or territory, or selection of an additional sales channel.
- Marginal costing is a costing technique that considers only the costs that vary directly with volume—direct materials, direct labour and variable factory overheads and ignores fixed cost in additional output decisions.
- Contribution is the excess of sales over marginal cost (variable cost) that is the amount left to meet fixed cost and profit expectation of an organization.
- The profit/volume ratio expresses the relationship between contribution and sales.
- Marginal costing as a managerial tool uses the decision criteria which are generally based on cost minimization, profit maximization and contribution maximization.

9.7 KEY WORDS

- **Marginal cost:** It is the cost of one additional unit of output.
- **Marginal costing:** It is an accounting technique which ascertains marginal cost of additional output by differentiating between fixed and variable costs.
- **Absorption costing:** It is a system of costing that recognizes all costs in ascertaining the cost of the product.
- **Contribution:** It is the difference between the marginal cost of various products manufactured and their respective selling price.

9.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Define marginal cost. Discuss the importance of classifying expenses into variable and fixed.
2. What is difference between Orthodox (or absorption) costing and marginal costing in concept and use?
3. Prepare a marginal cost statement from the information given below:

Direct Material	₹ 20,000
Direct labour	₹ 15,000

Factory overheads (50 per cent variable) ₹ 5,000
Selling and distribution overheads (40 per cent fixed) ₹ 8,000
Sales ₹ 70,000

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Long-Answer Questions

1. "The technique of marginal costing can be a valuable aid to management." Discuss the statement and give your view.
2. Discuss the applications of marginal costing technique.
3. Write a detailed note on the following:
   (i) Contribution (ii) Profit-volume ratio
   (iii) Semi-variable expenses.
4. The directors of a company are considering sales budgets for the next budget period. From the following information you are required to show clearly to management:
   (i) The marginal product cost and the contribution per unit; and
   (ii) The total contributions resulting from each of following sales mixtures:

	Product-A (₹)	***Product-B*** (₹)
Direct materials	₹ 20	₹ 18
Direct Wages	₹ 6	₹ 4
Fixed expenses (total) (variable expenses are allotted to products as 100 per cent of direct wages)	₹ 1,600	
Selling price	₹ 40	₹ 30

   Sales mixture
   (a) 100 units of product A and 200 of B
   (b) 150 units of product A and 150 of B
   (c) 200 units of product A and 100 of B.
   Recommend which of the sales mixtures should be adopted.
5. Sale of product amount to 200 unit per month at ₹ 10 per unit. Fixed overhead is ₹ 400 per month and variable cost ₹ 6 per unit. There is proposal to reduce price by 10 per cent. Calculate the present and future P/V ratio and find, by adopting P/V ratio, how many units be sold to maintain total profit.
6. The following particulars are obtained from records of a company engaged in manufacturing of two products X and Y from a certain raw material:

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	Product X (***Per Unit***)	***Product Y*** (***Per Unit***)
Sales	₹ 200	₹ 400
Material cost (₹ 20 per kg)	₹ 40	₹ 100
Direct wages (₹ 6 per hour)	₹ 60	₹ 120
Variable overheads	₹ 20	₹ 40
Total fixed overheads	₹ 20,000	

Comment on the profitability on each product when:

(a) Total sale potential in units is limited.

(b) Total sale potential in value is limited.

(c) Raw-materials is in short supply.

7. ESS EMM Co Ltd. submits the following operating statement:

			(₹)
Sales (1,60,000 @ ₹ 15 each)		24,00,000	
Variable costs:			
Direct material	4,80,000		
Direct labour	6,40,000		
Overheads	3,20,000	14,40,000	
Fixed cost		6,40,000	
Total cost			20,80,000
Profit			3,20,000

The plant capacity is 1,00,000 units. A customer from France is interested to purchase 40,000 units at a net price of ₹ 10 per unit. Advise the producer whether or not to offer should be accepted?

9.9 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 10 BREAK-EVEN ANALYSIS/ POINT (BEA/BEP)

NOTES

Structure

10.0 Introduction
10.1 objectives
10.2 Concept of Break-Even Point/Analysis
 10.2.1 Managerial Applications and Profit Planning
 10.2.2 Assumptions, Advantages and Limitations
 10.2.3 Margin of Safety
 10.2.4 Angle of Incidence
 10.2.5 Profit-Volume Graph
10.3 Answers to Check Your Progress
10.4 Summary
10.5 Key Words
10.6 Self Assessment Questions and Exercises
10.7 Further Readings

10.0 INTRODUCTION

Break-even analysis is a costing technique that helps executives in profit planning and consequently it is essential for them to have an in-depth knowledge about the nature and application of this technique. The narrow interpretation of break-even analysis limits it to the study of break-even point. The *break-even point* is defined as the volume of activity at which total sales revenue exactly equals total costs of the output produced or sold. At this level of operation sales revenue is adequate to cover all costs to manufacture and sell the product leaving no amount as profit, and therefore, this level is also known as *no profit no loss level*.

10.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the concept of BEP
- Describe the margin of safety
- Discuss the Managerial applications and Profit planning through break even analysis

10.2 CONCEPT OF BREAK-EVEN POINT/ ANALYSIS

The application of break-even analysis requires the use of the concept of marginal contribution which represents the amount left after deducting

variable costs from sales. Conceptually, contribution is the amount that is utilized to meet fixed cost and expected profit of the business. This brings to light an important fact that at break-even point total contribution will be exactly equal to total fixed cost as there would no profit at this point. Thus, in a situation where total costs of the output consist of only variable costs, the break-even point would be at zero level of operation. In the same way, profits cannot be expected in a situation where total costs comprise only fixed ones until contribution (*i.e.,* the amount of sale (per unit) that exceeds per unit variable cost) exceeds such costs. The discussion clearly reveals that determination of break-even point requires segregation of total costs into variable and fixed costs.

Break-even analysis is not merely limited to seeking the break-even point. In a broader sense, break-even analysis refers to the study of relationship between cost, volume and profit at different levels of sales or production which in accounting terminology is known as *cost-volume-profit analysis*. Cost-volume-profit analysis as a planning tool analyses the inherent relationship between price, cost structure, volume and profit.

Belkaoni defines cost-volume-profit analysis as *an examination of cost and revenue behavioural patterns and their relationships with profit. The analysis separates costs into fixed and variable components and determines the levels of activity where costs and revenues are in equilibrium*.

According to Schmiedicke and Nagy, 1978, cost-volume-profit analysis is *an analytical technique which uses the degree of cost variability for measuring the effect of changes in volume on resulting profits. Such analysis assumes that the plant assets of the firm will remain the same in the short run, therefore, the established level of fixed cost will also remain unchanged during the period being studied*.

To the author of this book, cost-volume-profit analysis is *a mature model to study the inter-related relationship between costs, price and profit structure of a company. It is a formal profit planning approach based on established relationship between different factors affecting profit*. The usual starting point in such an analysis is the determination of the company's break-even point. Thus, break-even analysis forms just one component of the total system of cost-volume-profit analysis. However, it is often a key part, and it can give the manager many insights into the data with which he or she is working (Garrison, 1976).

Cost-volume-profit analysis provides the following important information for managerial decision making:

- Cost of production at various levels of operation;
- Volume or level of production/activity required to attain a particular objective;
- Profits expected/earned; and
- Variation between cost of production and sales revenue.

NOTES

Break-even Computation

The two major approaches to compute break-even are:

- Mathematical approach
- Graphic approach

Mathematical Approach: Mathematically break-even can be computed by engaging the technique of unit contribution which is developed on the basis of marginal cost equation as discussed earlier. The equation can be stated as follows:

Sale = Variable cost + Fixed cost + Profit

Since at the break-even point profit is absent, therefore, the same equation for this purpose can be rewritten as follows:

Sales = Variable cost + Fixed cost

or Sales – Variable cost = Fixed cost

or Contribution = Fixed cost

The study of the above equation reveals that sales revenue of each unit leaves a certain amount in the shape of contribution margin to meet fixed costs. Thus, in order to work out the required number of units to break-even (where the amount of contribution will be sufficient to cover total fixed cost), the total fixed cost must be divided by the unit contribution. Accordingly, the break-even point can be calculated in terms of units by using the following equation:

$$\text{Break-even point (in terms of units)} = \frac{\text{Fixed cost}}{\text{Unit contribution margin}}$$

or

$$\text{BEP} = \frac{\text{FC}}{\text{SP} - \text{VC}}$$

where

BEP = Break-even point

FC = Total fixed cost

SP = Selling price per unit

VC = Variable cost per unit

The break-even point can also be calculated in terms of rupees. Although the simplest way to calculate it is to multiply the break-even sales in unit by the selling price, yet the other approach to compute the break-even sales in terms of rupees is to use contribution margin ratio*. In this approach the unit contribution margin as shown in above equation is replaced by the contribution margin ratio.

Accordingly, the break-even point in terms of rupees can be computed with the help of the equation as given under.

$$\text{BEP (in terms of rupees)} = \frac{\text{FC}}{\text{CMR}}$$

* Contribution margin ratio explains the relationship between contribution and sales. It represents the percentage of contribution to sales. The ratio is calculated as follows:
CMR = SP – VC ÷ SP, where SP and VC stands for selling price and variable cost per unit respectively.

where

FC = Total fixed cost

CMR = Contribution margin ratio

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In a situation where it is not possible to calculate contribution margin ratio as the selling price and variable cost per unit is not readily available, the break-even point in terms of rupees is computed with the help of Profit-volume ratio as shown below:

$$\text{BEP (in terms of rupees)} = \frac{\text{FC}}{\text{P/V ratio}}$$

where

FC = Total fixed cost

P/V ratio = Profit/volume ratio

The following illustrations will clear the application of mathematical approach to break-even analysis.

Illustration 10.1: Calculate break-even point from the following information:

Fixed cost = ₹ 1,200
Variable cost = ₹ 5,000
Sales in rupees = ₹ 7,000
Sales in units = ₹ 1,000

Solution

$$\text{BEP (in units)} = \frac{\text{FC}}{\text{SP} - \text{VC}} = \frac{1,200}{7-5} = 600 \text{ units}$$

$$\text{BEP (in Rupees)} = \frac{\text{FC}}{\text{CMR}} = \frac{1,200}{0.285} = ₹\ 4,200$$

Working:

(i) Calculation of variable cost = $\frac{5,000}{1,000} = ₹\ 5.00$

(ii) Calculation of selling price (per cost) = $\frac{7,000}{1,000} = ₹\ 7.00$

(iii) Calculation of contribution margin ratio (CMR)

$$\text{CMR} = \frac{\text{SP} - \text{VC}}{\text{SP}} = \frac{7-5}{7} = 0.286$$

Illustration 10.2: Compute beak-even point from below given information:

Fixed cost = ₹ 3,600
Variable cost = ₹ 15,000
Sales = ₹ 21,000

Solution: The formula applied in the above-mentioned question for the calculation of break-even point cannot be used in this problem as it lacks the information on selling price per unit and variable cost per unit, therefore, the break-even point will be calculated with the help of P/V ratio. Thus

$$\text{BEP (in rupees)} = \frac{\text{FC}}{\text{P/V ratio}} = \frac{3,600}{28.57/100} = \frac{3,600}{28.57} \times 12,6$$

NOTES

Working:

Calculation of profit/volume ratio

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{6,000}{21,000} \times 100 = 28.57 \text{ per cent}$$

Graphic Approach to Break-even Analysis

The break-even analyis can also be demonstrated graphically which is commonly known as break-even chart. A break-even chart is a graphic approach to the study of the relationship of cost, revenue and profit. The graphic instead of mathematical approach is often used because it tends to be more easily understood by the people whose acquaintance with mathematics is minimal and it provides an immediate view of variable costs, fixed costs, and profit at any level of activity.

Information for constructing a break-even chart can be obtained from the income statement of the concern. However, the total cost i.e., fixed cost, variable cost, and semi-variable cost must be classified only into two categories of costs—Fixed cost and variable cost. A brief description of these costs is as follows:

1. **Fixed Cost:** Fixed costs are the costs which remain fixed for all practical purposes to a certain level of activity. Once that level of activity is increased, the fixed cost will also increase to a specific degree. Examples of such costs are cost of plant and machinery, salaries, rent etc. These costs are shown on the graph by means of a straight line.
2. **Variable Cost:** These costs vary in proportion to output. This means that they increase directly with the volume of production. Cost of material, wages, carriage etc. are some examples of variable cost. For graphic application, these costs will be aggregated with the fixed cost to show amount of total cost.
3. **Semi-variable Cost:** Semi-variable costs possess the characteristics of both fixed and variable costs. These costs demand special attention from the management in splitting them into fixed and variable costs.

The graphic demonstration of break-even analysis in Figure 10.1 is made with the help of Illustration 10.3.

Illustration 10.3

Output (kg)	*Fixed Cost (₹)*	*Variable Cost (₹)*	*Total Cost (₹)*	*Sales Revenue (₹)*
0	2,000	—	2,000	0
1,000	2,000	2,000	4,000	3,000
2,000	2,000	4,000	6,000	6,000
3,000	2,000	6,000	8,000	9,000
4,000	2,000	8,000	10,000	12,000
5,000	2,000	10,000	12,000	15,000
6,000	2,000	12,000	14,000	18,000

Compute break-even point from the information given above with the help of graphic approach.

Solution: The drawing of break-even chart involves the following steps:

1. Sales volume (output) in units is shown horizontally on the X-axis.
2. Revenue and costs are shown vertically on the Y-axis.
3. A fixed cost line is drawn parallel to the X-axis as shown in Figure 10.1. In this figure, CF represents total fixed costs, which remain constant at ₹ 2,000 overall levels of output.
4. Variable costs are plotted from the left hand side of the fixed cost line. If such costs are plotted from the zero level (point) on the graph as shown in Figure 10.2, they show only the variable cost of production. In Figure 10.2, OTVC represents total variable costs which are ₹ 2 per kg at all levels of output. By plotting variable cost from the fixed cost line as shown in Figure 10.3, such line represents total operating cost. In Figure 10.3, two functions composed of fixed cost of ₹ 2,000 and variable cost of ₹ 2 per kg are combined as is represented by the line CTC.
5. The total revenue/Sales are plotted from zero point at the left as shown in Figure 10.4. Total sales revenue is shown as OSR in this figure and is ₹ 3 per kg at all levels of output.
6. Total cost and total sales revenue functions are combined as shown in Figure 10.5 to produce a break-even chart.
7. The break-even point in chart occurs where total cost line intersects revenue/sales line. In Figure 10.5, the intersection of total cost function, CTC and the total sales revenue function, OSR, occurs at point M, which establishes the break-even quantity.
8. Draw a perpendicular to the X-axis and Y-axis from the point of intersection of cost and sales line to determine break-even point in terms of units and rupees respectively. In Figure 10.5, MP1 and MP2 are the perpendiculars drawn form such intersection of cost and sales lines to Y-axis and X-axis respectively which determine break-even point at an output of 2,000 units and at a sales revenue of ₹ 6,000 respectively. Above break-even point, a firm will be profitable and below it firm will incur a loss.

NOTES

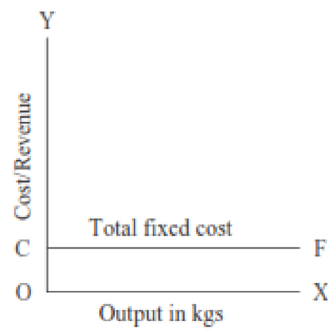


Fig. 10.1

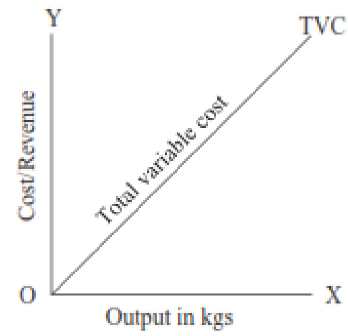


Fig. 10.2

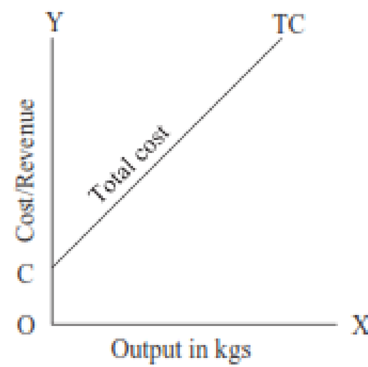


Fig. 10.3

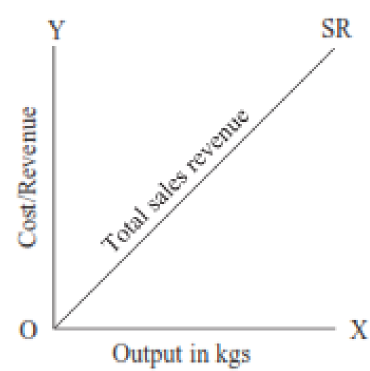


Fig. 10.4

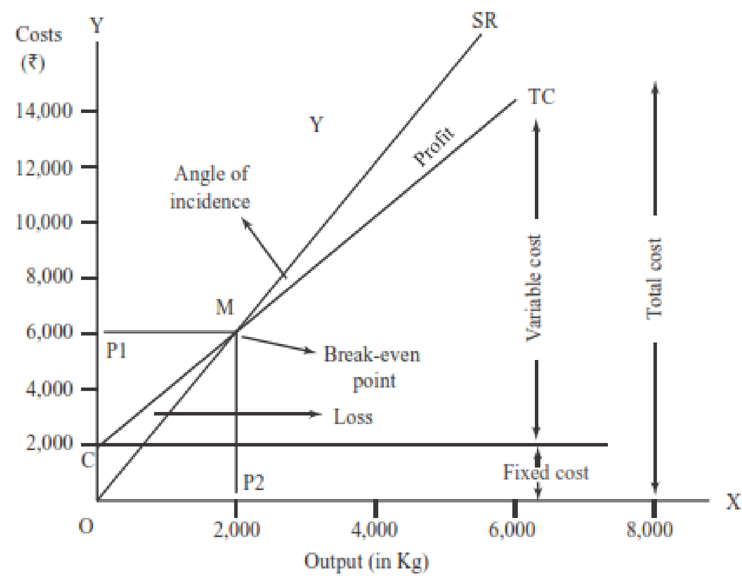


Fig. 10.5

Analysis of the Chart

The three data lines show how sales revenue, total cost, and fixed cost vary with volume in units. The vertical distance between the total cost line and the variable cost line represents fixed costs and remains constant. The vertical distance between sales and total cost represents profit; when the sales line is below the total cost line, profit is negative, namely a loss. The vertical distance between the sales line and the variable cost line is the marginal contribution. Thus, the chart speedily shows sales revenue, costs, marginal contribution, and profit at different output levels.

10.2.1 Managerial Applications and Profit Planning

Break-even chart serves management as an effective tool in profit planning and other related decisions. The following areas of decision making are usually exposed to the application of break-even chart.

Budgeting

The effect of budgeted sales on profit can be easily estimated with the use of break-even chart. Such an analysis can be made for the entire business or for a part of it.

The Make-or-Buy Decision

Management is usually confronted with the problem decision of make- or-buy an item. This problem is solved to a large extent by break-even chart as is clear from Figure 10.6. Assume that product can be purchased for ₹ 3 per unit and the company has to incur a fixed cost of ₹ 2,000 and a variable cost of ₹ 2 per unit if it decides to make the item. Under such conditions, the break-even point, where the total cost of manufacturing equals the total cost of buying, is 2,000 units. Here management has to decide about make or buy an item on the basis of number of units required. Accordingly, if more than 2,000 units are required, it would be economical for the company to make the product. However, this decision is not a profitable one if number of units required is less than 2,000.

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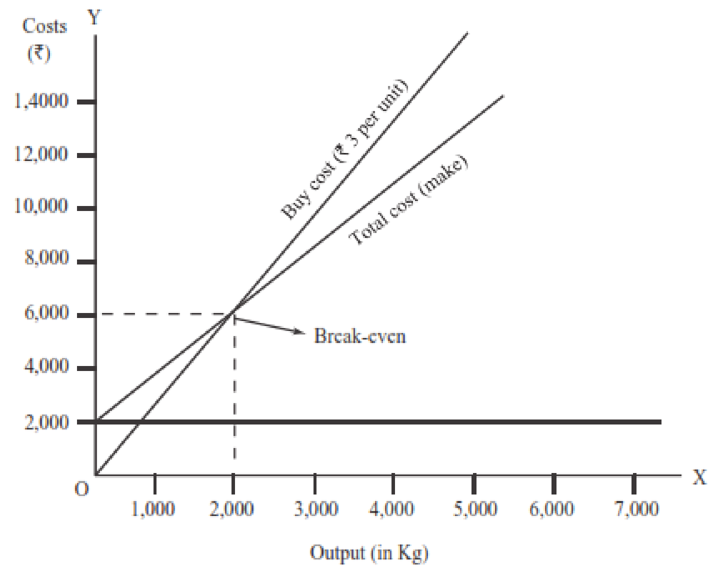


Fig. 10.6

The Pricing Decision

Break-even chart also helps management in pricing decision as it enables it to explore the effect of price alternatives on product profitability, as shown in Figure 10.7.

Illustration 10.4: ESS BEE Company submits the following information:

Fixed cost	₹ 6,000
Variable cost	₹ 1 per unit
Proposed selling price	₹ 2, ₹ 3, and ₹ 4 per unit

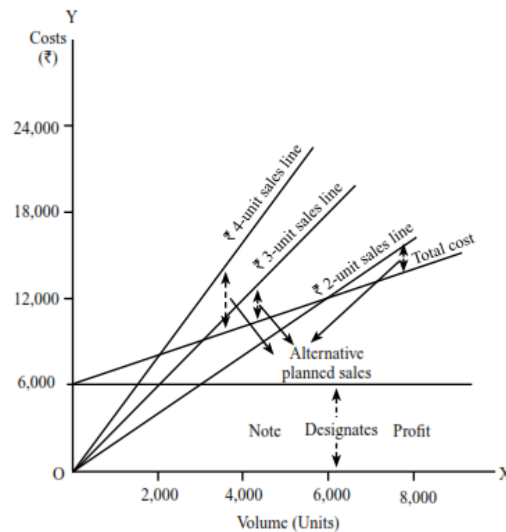


Fig. 10.7

Estimated sales:

8,000 units @ ₹ 2 per unit

4,000 units @ ₹ 3 per unit

3,500 units @ ₹ 4 per unit

You are required to suggest a suitable pricing policy that can offer maximum profit to the company.

Solution: Let us determine the expected profit of the company under various alternatives with the help of a break-even chart (Figure. 10.7).

In Figure 10.7, at each volume level, the vertical distance between the sales line and the total cost line represents profit. The chart clearly reveals that expected profit is greatest at a selling price of ₹ 4 per unit, it is then ₹ 4,500. A price of either ₹ 3, or ₹ 2 per unit gives profit of only ₹ 2,000. However, the margin of safety is not equally favourable at ₹ 4 per unit. At this point the difference between planned sales and break-even sales (where the sales line intersects the total cost line) is 1,500 units, compared with 2,000 units at a price of ₹ 2. On the other hand, the margin of safety is only 1,000 units at a price of ₹ 3. On the whole a price of ₹ 4 is indicated.

Sales Mix Analysis

The study of cost-volume-profit can be made easily with the help of break-even chart. Such a study can cover the entire product mix of a company instead of being limited to a single product. Each product would require a separate chart. The aggregate study of all charts can give a clear profitability picture of the given sales mix. The process shall be repeated for each mix and then the comparison of various mixes can easily indicate the profitable sales mix.

10.2.2 Assumptions, Advantages and Limitations

In this section, let's learn about the assumptions, advantages and limitations of Break-Even Analysis.

Assumption Underlying Break-Even Analysis

Before the reader draws any conclusions with respect to the accuracy of or the desirability of the break-even chart, it is essential that he is acquainted with the assumptions which have been made in its construction. These assumptions may be stated as follows:

(i) The chart assumes that only one product is being sold or that the same mix of products is going to be sold at each volume level. If more than one product is sold, the cost per unit of product (variable and fixed) will undoubtedly vary and the unit sales price will also probably differ for various products. Therefore, the assumption of linear total cost and linear sales functions would hold true only if it is assumed that at each

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volume level the proportion of each product sold to the total remains constant. If it is possible to accurately determine the fixed and variable costs applicable to each product, separate charts might be prepared for each product sold. These charts could then be combined to estimate profits at any combined sales volume for the individual products.

(ii) The chart assumes that fixed costs remain constant throughout the range of volumes depicted on the base line.

(iii) The chart assumes that the variable costs will vary in direct proportion to changes in volume or will remain constant per unit. However, some semi-variable cost may increase at increasing rate or at decreasing rate and the assumptions of a constant variable rate per unit may not be valid over a wide range of volume change.

(iv) A constant unit sales price is another assumption which is reflected in the chart in Figure 10.5.

(v) Increase in costs (fixed or variable) due to increase in price rather than volume is not reflected in the chart.

Advantages of Break-Even Chart

Break-even chart is a valuable tool in the hands of management as it helps it in a number of ways. The important among them are mentioned below:

(i) Break-even chart presents a view of important business facts and results more clearly than financial statements.

(ii) It examines the inherent relationship between cost, revenue and profit in such a way as to help business executives in decision making.

(iii) It reveals business strength and profit earning capacity of a firm without much difficulty and effort. The study of margin of safety and angle of incidence helps in number of decision making areas such as:

(a) Expansion in level of activity,

(b) Cost reduction,

(c) Fixation of selling price; and

(d) Product substitution.

(iv) It helps cost control more effectively by analysing the relationship between fixed and variable cost.

(v) It can ascertain profit at different levels of activity.

(vi) The selection of most profitable product mix is possible by studying profitability of various products.

(vii) It measures effect of changes in profit factors.

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Limitations of Break-Even Chart

Break-even chart suffers from following limitations:

(i) The first and foremost limitation of break-even chart is that it is based on number of assumptions which may not hold true in the actual practice. Fixed cost also increases beyond a specific level of activity. If the law of diminishing returns is applicable in the business, the assumption that variable costs do vary proportionally shall not prove effective. At the same time, sales revenue increases proportionally with volume of sales is not possible always.

(ii) It communicates a limited amount of information. The study of effect of change in fixed costs, variable costs and selling price requires drawing of number of charts.

(iii) A single break-even chart fails to explain effect of various product mixes in the profits.

(iv) It fails to take into consideration the important factors like plant capacity, production technology and methodology and capital employed which are very important for managerial decisions.

(v) It ignores the time gap between production and sales. The sales may vary because of various uncontrollable external factors which reduces the significance of the break-even chart as a management guide.

10.2.3 Margin of Safety

The amount by which the current volume of sales exceeds the break-even sales volume, either in units or rupees represents margin of safety. This is the difference between the total sales of a firm and the amount of sales at break-even point. It indicates the extent to which sales may decrease before the company suffers a loss. A margin of safety is calculated as follows:

$$M/S = S_A - S_B$$

where

M/S = Margin of safety

S_A = Actual volume of sales

S_B = Break-even volume of sales

Margin of safety may be expressed as a percentage based either on units or rupee value. For this purpose, the following formulas are used:

1. $\text{M/S (in rupees)} = \dfrac{\text{Profit}}{\text{P/V Ratio}}$
2. $\text{M/S (in units)} = \dfrac{\text{Profit}}{\text{Contribution per unit}}$

A high margin of safety is the sign of prosperity of the business. A low margin would indicate high fixed cost. Such a critical situation calls for:

(i) Increase in selling price;

(ii) Decrease in variable costs;

(iii) Replacement of existing product line by a more profitable line; and

(iv) Increase in volume of production.

Illustration 10.5: Compute margin of safety of Suba Limited from the information given below:

Selling price = ₹ 8 per unit

Variable cost = ₹ 5 per unit

Fixed cost = ₹ 45,000

Sales (current) = 25,000 units p.a.

Solution

(i) M/S (in rupees) = SA – SB

= ₹ 2,00,000 – ₹ 1,20,000 = ₹ 80,000

(ii) M/S (in units) = 25,000 units – 15,000 units = 10,000 units

OR

(iii) M/S (in rupees) = $\frac{\text{Profit}}{\text{P/V Ratio}}$

$$= \frac{30,000}{37.5} \times 100 = ₹\ 80,000$$

(iv) M/S (in units) = $\frac{\text{Profit}}{\text{Contribution per unit}}$

$$= \frac{30,000}{3} = ₹\ 10,000 \text{ units}$$

Working:

I. Marginal cost statement

Output: 25,000 units

Particulars	***Amount Per Unit*** (₹)	***Total*** (₹)
Sales	8	2,00,000
Less: Marginal cost	5	1,25,000
Contribution	3	75,000
Less: Fixed cost	–	45,000
Profit		30,000

II. Calculation of P/V ratio

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sale}} \times 100 = \frac{75,000}{2,00,000} \times 100 = 37.5 \text{ per cent}$$

III. Calculation of break-even point

$$\text{BEP (in units)} = \frac{\text{Fixed cost}}{\text{SP} - \text{VC}} = \frac{45,000}{8-5} = \frac{45,000}{3} = 15,000 \text{ units}$$

$$\text{BEP (in rupees)} = \frac{\text{FC}}{\text{CMR}}$$

$$\text{BEP} = \frac{45,000}{3/8\,*} = \frac{45,000}{3} \times 8 = ₹\,1,20,000$$

$$*\text{CMR} = \frac{\text{SP} - \text{VC}}{\text{SP}} = \frac{8-5}{8} = \frac{3}{8} = 0.375$$

10.2.4 Angle of Incidence

In break-even chart, where sales line intersects the total cost line that angle is known as angle of incidence. From managerial point, a large angle of incidence would mean high rate of profit. A narrow angle reveals high variable cost that results in low profits. Management always aims to maintain as large an angle as possible. Business experts suggest to study together margin of safety and angle of incidence for examining worth of a company.

10.2.5 Profit-Volume Graph

A profit-volume graph exhibits the relationship of profit to volume of sales. This graph is a simpler presentation of the facts illustrated in the break-even chart. However, it fails to show how cost vary with the change in the level of activity. Construction of profit graph (see Figure 10.8) is relatively easy and the procedure involves:

(i) Selecting a scale for sales on the X-axis.

(ii) Selecting a scale for profit or loss and fixed costs on the Y-axis.

(iii) Dividing the graph into two areas. One area reveals profit and the other loss. These areas as formed by the sales line which divides the graph horizontally.

(iv) On the vertical axis, the area below the sales line represents fixed costs and that above it represents profit.

(v) Points are plotted for the required fixed costs and for profits and a line is drawn to connect the two points.

Illustration 10.6: A company produces 200 units and sells them at ₹ 10 each unit. The marginal cost of production is ₹ 6 each and total fixed cost of the concern is ₹ 400 per annum. Construct a profit graph (Figure 10.8).

Solution

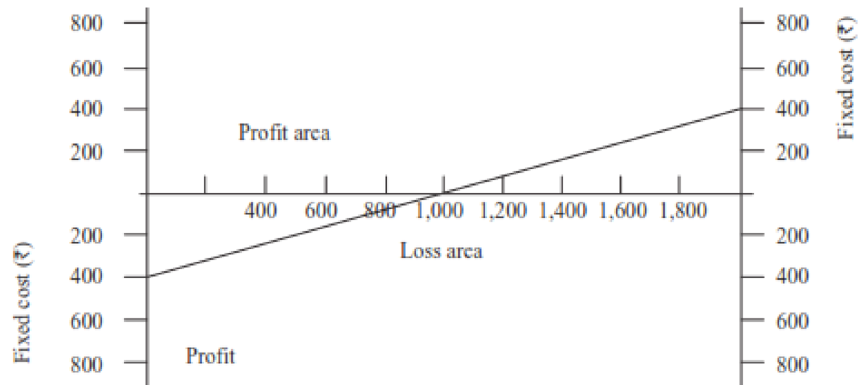


Fig. 10.8 *Profit Graph*

Arithmetical verification

Output (units)	200
Sales	(₹) 2,000
Less: Marginal cost	1,200
Contribution	800
Less: Fixed cost	400
Profit	400

$$\text{P/V ratio} = \text{C/S} \times 100 = \frac{800}{2{,}000} \times 100 = 40 \text{ per cent}$$

$$\text{Break even point} = \frac{\text{FC}}{\text{P/V ratio}} = \frac{400}{40\%} = ₹\,1{,}000$$

$$\text{Margin of safety} = \frac{\text{Profit}}{\text{P/V ratio}} = \frac{400}{40\%} = ₹\,1{,}000$$

Illustration 10.7: A factory manufacturing printing machines has the capacity to produce 600 machines per annum. The marginal (variable) cost of each machine is ₹ 300 and each machine is sold for ₹ 375. Fixed overheads are ₹ 30,000 per annum. Calculate the break-even point for output and sales.

Solution

$$\text{Break-even point (for output)} = \frac{\text{FC}}{\text{SP} - \text{VC}} = \frac{30{,}000}{375 - 300} = \frac{30{,}000}{75} = 400 \text{ machines}$$

$$\text{Break-even point (for sales)} = \frac{\text{FC}}{\text{CM}} = \frac{30{,}000}{0.20} = 1{,}50{,}000$$

Working:

Calculation of Contribution Margin (CM)

$$CM = \frac{SP - VC}{SP} = \frac{375 - 300}{375} = \frac{75}{375} = 0.20$$

Illustration 10.8: From the following information calculate the break-even point and the turnover required to earn a profit of ₹ 60,000.

Fixed overheads	= ₹ 42,000
Variable cost	= ₹ 4 per unit
Selling price	= ₹ 10 per unit

If the company is earning a profit of ₹ 60,000 express the margin of safety available to it.

Solution

(A) Calculation of break-even point

(i) $$\text{BEP (in units)} = \frac{FC}{SP - VC} = \frac{42,000}{6} = 7,000 \text{ units}$$

(ii) $$\text{BEP (in rupees)} = \frac{FC}{CM *} = \frac{42,000}{0.60} = ₹\ 70,000$$

*Calculation of contribution margin

$$CM = \frac{SP - VC}{SP} = \frac{10 - 4}{10} = \frac{6}{10} = 0.60$$

(B) Calculation of turnover required to earn a profit of ₹ 60,000

(i) $$\text{Desired turnover (output)} = \frac{\text{Fixed cost} + \text{Desired profit}}{SP - VC}$$

$$= \frac{₹\ 42,000 + ₹\ 60,000}{10 - 4} = \frac{1,02,000}{6} = 17,000 \text{ units}$$

(ii) $$\text{Desired turnover} = \frac{FC + \text{Desired profit}}{CM}$$

$$= \frac{₹\ 42,000 + ₹\ 60,000}{0.60} = \frac{1,02,000}{0.60} = 1,70,000$$

(C) Calculation of margin of safety when the profit is ₹ 60,000

M/S (in units) = $S_A - S_B$ = 17,000 – 7,000= 10,000 units

M/S (in rupees) = $S_A - S_B$ = 1,70,000 – 70,000 = ₹ 1,00,000

Illustration 10.9: A company budgets a production of 3,00,000 units at a variable cost of ₹ 10 each. The fixed costs are ₹ 15,00,000. The selling price is fixed to yield 20 per cent profit on cost. You are required to calculate:

(a) P/V ratio and

(b) Break-even point

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Solution

(a) Calculation of P/V ratio

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{24,00,000^{**}}{54,00,000^{*}} \times 100 = 44.44 \text{ per cent}$$

*Calculation of sales

Fixed cost	₹ 15,00,000
Variable cost	30,00,000
Total cost	45,00,000
Profit (20 per cent on cost)	9,00,000
Sales	₹ 54,00,000

**Calculation of contribution

Contribution = Sales – Variable cost = 54,00,000 – 30,00,000 = ₹ 24,00,000

(b) Calculation of break-even point

$$\text{BEP (in units)} = \frac{\text{FC}}{\text{SP} - \text{VC}} = \frac{15,00,000}{18-10} = \frac{15,00,000}{8} = 1,87,500 \text{ units}$$

$$\text{BEP (in rupees)} = \frac{\text{FC}}{\text{CM}^{*}} = \frac{15,00,000}{0.4444} = ₹\ 33,75,000 \text{ (app.)}$$

*Calculation of contribution margin

$$\text{CM} = \frac{\text{SP} - \text{VC}}{\text{SP}} = \frac{18-10}{18} = 8/18 = 0.4444$$

Illustration 10.10: Calculate

(i) The amount of fixed expenses

(ii) The number of units to break-even

(iii) The amount of sales to earn a profit of ₹ 5,00,000

(iv) The profit with sales of ₹ 10,00,000

The company's sales turnover and profit during two periods were as follows:

	Sales (₹)	***Profit*** (₹)
Period I	20,00,000	2,00,000
Period II	30,00,000	4,00,000

Solution

	Sales (₹)	***Profit*** (₹)
Period I	20,00,000	2,00,000
Period II	30,00,000	4,00,000
Change in Period II over Period I	10,00,000	2,00,000

(i) $$\text{P/V ratio} = \frac{\text{Change in profits}}{\text{Change in sales}} \times 100 = \frac{₹\ 20,00,000}{₹\ 10,00,000} \times 100 = 20 \text{ per cent}$$

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(ii) Calculation of fixed cost

Fixed cost = Contribution – Profit

Since contribution is equal to P/V ratio of sales, therefore, the above equation can be rewritten as:

Fixed Cost= (P/V ratio × sales) – Profit

= (20 per cent × ₹ 30,00,000) – ₹ 4,00,000

= ₹ 6,00,000 – ₹ 4,00,000 = ₹ 2,00,000

(iii) Calculation of break-even point

$$\text{BEP (in rupees)} = \frac{\text{Fixed cost}}{\text{P/V ratio}} = \frac{₹\ 2,00,000}{20 \text{ per cent}} = ₹\ 10,00,000$$

(iv) Calculation of desired amount of sales to earn a profit of ₹ 5,00,000

$$\text{Desired Sales} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{P/V ratio}}$$

$$= \frac{₹\ 2,00,000 + ₹\ 5,00,000}{20 \text{ per cent}} = \frac{₹\ 7,00,000}{20 \text{ per cent}} = ₹\ 35,00,000$$

Verification

Sales	₹ 35,00,000
Less: Marginal cost of sales (80 per cent)	₹ 28,00,000
Contribution (20 per cent)	₹ 7,00,000
Less: Fixed cost	₹ 2,00,000
Profit	₹ 5,00,000

(v) Calculation of profit with sales of ₹ 10,00,000

Profit = Contribution – Fixed cost

Since contribution is equal to P/V ratio of sales, therefore, the above equation can be rewritten as:

Profit = (P/V ratio × sales) – Fixed cost

(20 per cent × ₹ 10,00,000) – ₹ 2,00,000

= ₹ 2,00,000 – ₹ 2,00,000 = 0

Illustration 10.11: S.V. Ltd., a multi-product company, furnishes you the following data relating to the year 2006.

Particulars	***First Half of the Year* (₹)**	***Second Half of the Year* (₹)**
Sales	45,000	50,000
Total costs	40,000	43,000

Assuming that there is no change in price and variable costs and that the fixed expenses are incurred equally in the two half year periods, calculate for the year:

(i) The profit-volume ratio

(ii) Fixed expenses

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(iii) Break-even sales (C.A. Inter, adapted)

Solution: The present problem is almost similar to that of the Illustration 10.16. However, the difference between the two is that in the present problem the details of sales and total costs are given whereas in the Illustration 10.16 the details of sales and profits were given. The present problem can be made similar to the Illustration 10.16 in the following manner:

Position of Sales and Profits of S.V. Ltd. for 2006

Particulars	*Sales* (₹)	*Total Costs* (₹)	*Profits* (₹)
First half	45,000	40,000	5,000
Second half	50,000	43,000	7,000
Difference	5,000	3,000	2,000

Now for the calculation of the P/V ratio, fixed cost and break-even sales, the same procedure will be used as was employed in the case of Illustration 10.16.

I. Calculation of P/V ratio:

$$\text{P/V ratio} = \frac{\text{Change in profit}}{\text{Change in sales}} = \frac{₹\ 2{,}000}{₹\ 5{,}000} \times 100 = 40 \text{ per cent}$$

II. Calculation of Fixed cost

Sales = Fixed cost + Variable cost + Profit

₹ 50,000 = Fixed cost + 60 per cent of ₹ 50,000 + ₹ 7,000

₹ 50,000 = Fixed cost + ₹ 30,000 + ₹ 7,000

₹ 50,000 = Fixed cost + ₹ 37,000

₹ 50,000 – ₹ 37,000 = Fixed cost

₹ 13,000* = Fixed cost

*Since for the calculation of fixed cost, the data used relates to the second half of the year, therefore, the fixed cost of ₹ 13,000 as calculated above relates to six months only. Accordingly the fixed cost for the whole year will be ₹ 26,000 (₹ 13,000 + ₹ 13,000)

III. Calculation of break-even point

$$\text{BEP (in rupees)} = \frac{₹\ 26{,}000}{40 \text{ per cent}} = ₹\ 65{,}000$$

Illustration 10.12: The Disco Beat Company sells records for ₹ 20 each.
The cost expected are as follows:

Variable manufacturing cost	₹ 8 per record
Variable selling cost	₹ 4 per record
Fixed manufacturing costs	₹ 60,000
Fixed selling costs	₹ 20,000
Tax rate	40 per cent

(i) Using a contribution-margin format prepare an income statement (after tax) if 2,00,000 records were sold in 2006.

(ii) Compute the break-even point in rupees.

(iii) If 2,00,000 records were sold, determine the margin of safety ratio.

(iv) Determine the number of records that must be sold in order to generate an after tax net income of ₹ 80,000.

(*M.Com, 1994*)

Solution

(i) **Marginal Cost Statement**

A. Sales	20	40,00,000
B. Marginal cost:		
Variable manufacturing cost	8	16,00,000
Variable selling cost	4	8,00,000
Total (B)	12	24,00,000
C. Contribution (A – B)	8	16,00,000
D. Fixed cost:		
Fixed manufacturing cost		60,000
Fixed selling cost		20,000
Total (D)		80,000
Profit before tax (C – D)		15,20,000
Less: Tax 40 per cent		6,08,000
Profit after tax		9,12,000

(ii) Break-even point (in rupees) = FC/CM

$$= \frac{₹\ 80,000}{8/20\ *} = ₹\ 2,00,000$$

*CM = SP – VC/SP = 20 – 12/20 = 8/20

(iii) $$\text{Margin of safety ratio} = \frac{\text{Actual sales} - \text{Break-even sales}}{\text{Actual sales}}$$

$$= \frac{2,00,000 - 10,000\ **}{2,00,000} = \frac{1,90,000}{2,00,000} = 0.95$$

$$**\ \text{Break-even point} = \frac{₹\ 80,000}{₹\ 8} = 10,000 \text{ units}$$

(iv) $$\text{Desired net income} = \frac{\text{FC} + \dfrac{\text{Desired profit after tax}}{1 - \text{Tax rate}}}{\text{SP} - \text{VC}}$$

$$= \frac{₹\ 80,000 + \dfrac{₹\ 80,000}{1 - 0.40}}{20 - 12} = \frac{₹\ 80,000 + \dfrac{₹\ 80,000}{+\ 0.60}}{8}$$

$$= \frac{₹\ 80,000 + 1,33,333}{8} = \frac{2,13,333}{8} = 26,667 \text{ units}$$

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Check Your Progress

1. Mention the formula for the calculation for Break-even point in terms of units.
2. From where is information for constructing a break-even chart obtained?
3. What does the vertical distance between the total cost line and variable cost line represents?
4. What is the meaning of low margin of safety?

10.3 ANSWERS TO CHECK YOUR PROGRESS

1. The formula for the calculation for Break-even point in terms of units is:

   Break-even point (in terms of units)

   $$= \frac{\text{Fixed cost}}{\text{Unit contribution margin}}$$

   $$\text{BEP} = \frac{FC}{SP - VC}$$
2. The information for constructing a break-even chart can be obtained from the income statement of the concern. However, the total cost, i.e., fixed cost, variable cost, and semi-variable cost must be classified only into two categories of cost: fixed and variable cost.
3. The vertical distance between the total cost line and variable cost line represents fixed costs and remains constant.
4. A low margin of safety would indicate high fixed cost.

10.4 SUMMARY

- Break-even analysis is a costing technique that helps executives in profit planning.
- The break-even point is defined as the volume of activity at which total sales revenue exactly equals total costs of the output produced or sold.
- Since, at break-even level of operation sales revenue is adequate to cover all costs to manufacture and sell the product leaving no amount as profit, therefore, this level is also known as no profit no loss level.
- Cost-volume-profit analysis is a mature model to study the inter-related relationship between cost, price and profit structure of a company. It is a formal profit planning approach based on established relationship between different factors affecting profit.

- The break-even analysis can also be demonstrated graphically, which is commonly known as break- even chart.
- A break-even chart is a graphic approach to the study of the relationship of cost, revenue and profit.
- Fixed costs are the costs which remain fixed for all practically purposes to a certain level of activity.
- Variable costs vary in proportion to output.
- Semi-variable costs posses the characteristics of both fixed and variable costs.
- The amount by which the current volume of sales exceeds the break-even sales volume, either in units or rupees represents margin of safety. Margin of safety may be expressed as a percentage based either on units or rupee value.
- In break-even chart, where sales line intersects the total cost line that angle is known as angle of incidence. From managerial point, a large angle of incidence would mean high rate of profit. A narrow angle reveals high variable cost that results in low profit.
- A profit-volume graph exhibits the relationship of profit to volume of sales. This graph is a simpler presentation of the facts illustrated in the break-even chart.

10.5 KEY WORDS

- **Break even point:** It is defined as the volume of activity at which total sales revenue exactly equals total costs of the output produced or sold.
- **Cost volume profit analysis:** It is a planning tool which analyses the inherent relationship between price, cost structure, volume and profit.
- **Margin of safety:** It is the amount by which the current volume of sales exceeds the break-even sales volume, either in units or rupees.
- **Angle of incidence:** It is the angle where sales line intersects the total cost line.

10.6 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Define the concept of cost-volume profit analysis.
2. Explain the term Margin of safety. How it helps managers in decision making?
3. Calculate the BEP in the following cases:

The fixed costs for the year are ₹ 1,20,000, variable cost per unit for the single product being made ₹ 4. Estimated sales (at 100 per cent capacity) for the period are 10,000 units. The number of units involved coincides with the expected volume of output. Each unit sells ₹ 20.

Long-Answer Questions

1. Discuss the managerial applications of cost-volume-profit analysis.
2. What do you understand by break-even chart? Explain its various assumptions.
3. Write short notes on:

   (i) Angle of incidence (ii) Break-even point (iii) Profit-volume chart.
4. From the following data, calculate:
   (i) Break-even point expressed in amount of sales in rupees
   (ii) Number of units that must be sold to earn a profit of ₹ 60,000 per year

Sales price	₹ 20 per unit
Variable manufacturing cost	₹ 11 per unit
Variable selling cost	₹ 3 per unit
Fixed factory overhead	₹ 5,40,000 per year
Fixed selling cost	₹ 2,52,000 per year

5. The following figures for profit and sales are obtained from the account of Great Ess Co. Ltd.

Year	*Sales* (₹)	*Profit* (₹)
19 × 5	20,000	2,000
19 × 6	30,000	4,000

   Calculate
   (a) P/V ratio (b) Fixed cost (c) Break-even sales and
   (d) Sales to earn profit of ₹ 5,000.
6. From the following results of a company determine by how much the value of sales must be increased for the company to break-even:

Net sales	₹ 4,00,000
Fixed cost	₹ 2,00,000
Variable cost	₹ 2,40,000

   Use a break-even chart to illustrate the case.
7. The selling price of a product was ₹ 200 per unit as against its variable cost of ₹ 100 per unit. The total fixed costs were ₹ 2,00,000. Calculate the effect of a reduction in price by ₹ 40 per unit on the P/V ratio,

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break-even point and margin of safety if 4,000 units were produced and sold.

8. The following data relate to a company for the year ended 31 December, 1988.

   Units produced = 20,000

   Fixed overheads = ₹ 50,000

   Variable cost per unit = ₹ 6

   Selling price per unit = ₹ 10

   Prepare a P/V graph.

10.7 FURTHER READINGS

Sahaf, M. A. 2010. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 11 DIFFERENTIAL COSTING

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Structure

11.0 Introduction
11.1 Objectives
11.2 Nature and Scope of Differential Costing
11.3 Decision Making Process
11.4 Application of Differential Costing
11.5 Answers to Check Your Progress
11.6 Summary
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11.9 Further Readings

11.0 INTRODUCTION

While studying the unit on marginal costing, one realizes how important it is for the decision makers to split total costs into fixed and variable costs in order to decide about additional output. However, such an approach fails to bring fruitful results when a firm is confronted with an alternative choice decision which involves evaluation of two or more alternatives in order to make a final choice. To meet the demands of such a decision firms need cost data on competing alternatives which are generally not readily available from their accounting records, and therefore, call for an attempt on the part of the firm to estimate costs of competing alternative courses of action. In fact, a firm's attempt to estimate costs of alternate courses of action that would help it to choose among the competing alternatives calls for the application of differential costing which studies the effects of alternative decisions on total costs. However, the application of differential costing as an aid to decision making demands a clear understanding of the concept of relevant cost and the decision making process on the part of user. Accordingly in this chapter an attempt is made to discuss the nature and scope of differential costing which will be followed by a discussion on relevant cost and decision making process.

11.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the nature and scope of differential costing
- Describe the decision making process
- Discuss the managerial applications of differential costing

11.2 NATURE AND SCOPE OF DIFFERENTIAL COSTING

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Differential costing is a costing technique that examines the effects of alternative courses of action on total costs. While commenting on the nature and scope of differential costing the Chartered Institute of Management Accountants, 1991, London states that it is a technique used in the preparation of ad hoc information in which only cost and income differences between alternative courses of action are taken into consideration. Such a costing technique focuses on the study of differential costs which refers to the amount of change in costs resulting from the selection of one alternative to the other. Thus, differential costing studies the effects of alternative decisions on total costs. The amount of expected change from an alternative choice decision might result either in an increase or decrease in the total costs. From this apparently one gets the impression that a differential cost can take the form of incremental or decremental cost which ultimately will be covered by incremental costing and decremental costing, respectively. However, such a classification is just superficial as the scholars generally use the term incremental costing for differential costing.

Differential Costing vs. Marginal Costing

Since differential costing studies cost differences between alternative courses of action, therefore, apparently it may sound similar to marginal costing. But in the real sense, it is not so as differential costing aims to study the impact of alternative courses of actions on the costs whereas marginal costing examines the relationship between cost and volume. Further, the concept of differential costing is based on total cost which is not true of marginal costing that considers only direct/variable costs and ignores fixed cost in its application. Although, both the techniques help firms in cost analysis and cost presentation yet they have large distinctive and uncommon areas of study and application. Some of the differences are summarized below:

- Differential costing is perspective in nature whereas marginal costing is generally historical in nature.
- For differential costing, the firms can use either traditional, i.e., absorption or contribution approach for the presentation of data for decision makers; marginal costing advocates contribution approach for this purpose.
- Under marginal costing, cost per unit does not change despite the change in the range of production. But that is not always true of differential costing where the cost per unit may change with a change in range of production.

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- The set of tools used in differential costing for performance evaluation is different from that recommended by marginal costing.
- Differential costing is applicable to an additional volume of production whereas marginal costing is used for additional units.

Relevant Costs

One of the essential features of differential costing is that it considers only relevant costs in its application and thus ignores historical costs. The term relevant costs as used in differential costing refer to the costs that are pertinent to the decision which is under the consideration of a decision-maker. In fact, such costs have impact on a decision maker's intended outcome. Commenting on the nature of relevant cost Chartered Institute of Management Accountants, 1991, London states that relevant costs are said to be costs appropriate to aiding the making of specific management decisions. Thus relevant cost represents the amount of difference in terms of cost between several alternative courses of action that are under consideration of a decision–maker. Such a cost can be determined only in the context of a particular decision. For example, if an alternative 'A' costs a firm ₹ 50,00,000 and 'B' costs ₹ 60,00,000, the amount ₹ 10,00,000 which is the difference between alternatives A and B, will be the relevant cost for the firm. This example brings to light an important fact that a relevant cost needs to be a cash cost and not a non-cash cost like a depreciation which would not result in any kind of differential cost. In fact, a cost to be relevant for the purpose of differential costing has not only to be associated with a firm's decision but also a cash cost. Since relevant costs represent future costs that differ across alternatives, such costs possess the following two features:

- Future-oriented—Relevant costs are future costs and not the ones that have already been incurred; and
- Differ between alternatives—Relevant costs are bound to change as a result of alternative course of action. Thus, the costs that remain constant between different alternatives do not fall within the scope of relevant costs.

The analysis of the above features of relevant costs brings out clearly the fact that such costs are basically differential costs—the amount of change in cost that a firm expects from a course of action as compared with an alternative. However, one has to remember that sunk costs are not considered in the analysis of relevant costs.

11.3 DECISION MAKING PROCESS

Decision making being one of the basic functions of a manager takes place at every level in the organization. Since a management accountant is responsible for generating relevant and requisite information for use in decision making,

therefore, he needs to possess the understanding of the nature and process of decision making. Decision making is the process of making choices between alternative courses of action. To ensure a right choice, a decision maker has to follow a systematic approach in decision making which consists of the following steps:

- Identification and analysis of the problem;
- Identification of alternatives;
- Evaluation of alternatives;
- Selection of an alternative;
- Detailed plan for carrying out of the alternative; and
- Evaluation and control.

Identification and Analysis of the Problem

Every rational decision making process begins with the identification of the problem. The identification of a problem provides a decision maker an opportunity to work for the solution of the problem. However, mere identification of the problem will not help a decision maker to find a solution for the problem. Every problem calls for an in-depth study as generally the problems are characterized by 'ice-berg' principle where a little portion is visible and the major portion is hidden about which the decision maker has no clue. Therefore, a decision maker has to make all efforts to identify and examine every issue involved in the problem before making any attempt to find a logical solution for the problem. In fact, such an attempt calls for problem audit which will help a decision maker not only to identify the possible causes of the problem but also formulate the objectives to be met in solving the problem.

Identification of Alternatives

The analysis of the problem is followed by the identification of feasible alternatives that may serve as potential solutions to a problem. This step of decision making calls for a prediction which, in fact, is itself a decision about how to make decision. However, a decision maker has to remember that best possible solutions do not automatically submit themselves to the decision making process, he has to formulate a variety of ways of devising alternatives. Although a number of tools and techniques like lateral thinking, digging a hole elsewhere, and morphological approach have been developed over the year to help decision makers in this regard yet such an attempt calls for a lot of effort on the part of decision makers in terms of continuous research and thinking. In the past this activity was purely based on a manager's intuition, however, at present, many managers prefer to use decision support system for this purpose.

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Evaluation of Alternatives

In this step of decision making, a management accountant has a tremendous role to play by providing adequate information to the decision maker on the economic and financial worth of the alternatives that is essential for evaluation. To discharge this function effectively, a management accountant needs to possess knowledge about a number of tools and techniques like profit planning, capital budgeting, risk techniques, linear programming, decision tree and forecasting techniques.

Selection of an Alternative

The central task of decision making is the choice from among alternatives. To choose the best alternative, a decision-maker needs to devise the selection criteria which may not be easy. Generally, the choice of the best alternative is simply accomplished by selecting the alternative which best meets the chosen criterion. Logically, a decision maker would prefer to choose the best alternative but practically speaking it is difficult to define the 'best' as different criteria would result in different decisions from the same set of alternatives. Although, for certain decision situations, decision makers can devise the selection criteria that would help them to identify the best alternative yet some decision situations are so complex that devising any selection criteria for them is practically impossible. However, a decision-maker has to take a number of factors including the ones like resources, competence and experience of the company that have greater impact on the choice of the alternative.

Detailed Plan for Carrying out of the Alternative

Once the selection of the alternative is made, a decision-maker has to carry out the same. Such a step may demand the implementation of plans and programmes.

Evaluation and Control

After the plans and programmes have been implemented to attain the desired outcome of the decision, a decision maker has to evaluate the actual performance with a purpose to find how actual results reconcile with the desired outcomes. This would also mean to devise and implement the necessary measures if the actual performance is not in tune with the standards.

Check Your Progress

1. Which out of the following two cost techniques is perspective in nature: differential or marginal costing?
2. List the tools available with management accountants for evaluation of alternatives.

11.4 APPLICATION OF DIFFERENTIAL COSTING

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Differential costing has tremendous potential as a decision making tool. It can help a firm in such decisions that fall within the scope of following areas of business:

- make or buy
- accept or reject special order
- add or drop products
- sell or process
- operate or shutdown
- lease or sell
- expand or reduce
- reduce or maintain price

Make or Buy

In a highly competitive market, one of the most perplexing problems that a manufacturer faces is arriving at a good make-or-buy decision. In fact, it is not uncommon to find that firms need different components in the manufacturing of products like automobiles, electronics and industrial products. Such components can be manufactured within the firm or can be procured from the suppliers. Such decisions have serious financial implication for the business, therefore, management hast to deal with this issue carefully. In this regard, differential costing helps a firm by ascertaining the relevant cost of both the options—make or buy. However, such an issue crops up only once there exists some unutilized capacity within the existing productive capacity which can be exploited without incurring any infrastructural cost. In fact, differential costing can help a firm in both situations, i.e., when it is considering to manufacture a component that is being currently procured from a supplier or to procure a component from the suppliers that is being currently manufactured.

Illustration 11.1: An automobile manufacturer is considering a proposal to procure a component from the supplier which is currently being manufactured internally. The company is currently operating at 75% of capacity and no major increase in production is expected in the near future. The cost per unit of manufacturing the component is estimated as follows:

	₹
Direct Material	120
Direct Labour	60
Overhead (40% variable)	90
Total Cost per unit	270

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You are required to advise the company whether to buy the component from outside if the part is available in the open market for ₹ 250 per unit.

Solution: A cursory analysis of make price (₹ 270) and buy price (₹ 250) indicates that make price is more than buy price therefore, it is profitable for the firm to buy the product. However, this decision needs a comparison of buy cost with avoidable cost (variables costs only as fixed costs cannot be avoided in the short run). Therefore, buy costs of the component which amounts to ₹ 250 is much higher in comparison to avoidable cost of ₹ 216* that can be avoided if the company decides to stop manufacturing of the component under consideration. This mean the component would cost ₹ 304 (₹ 250 i.e., buy cost + ₹ 54 i.e., fixed costs which cannot be avoided in the short run) if the company decided to stop manufacturing component internally and buy externally. Therefore, it is recommended that the company must manufacture the component internally.

*Calculation of avoidable costs if company decides to stop manufacturing of the component:

	₹
Direct Material	120
Direct Labour	60
Overhead (40% variable)	36
Total Cost per unit	216

Accept or Reject Special Order

It is not uncommon to find that firms get opportunities to increase its sales volume by receiving special orders for supply of such products that are within its product lines. However, such orders generally differ from normal marketing practice as they call for special discounts in prices. Such a decision is not a straight forward decision which can be decided on the basis of pricing that the firm charge under normal circumstances. In fact, such a decision calls for differential analysis which aims to compare the differential costs with differential revenue between the existing volume of sales and expected volume of sales if a special order is accepted. If the additional output, required to meet the demands of special order can be managed within the existing production capacity of the firm, the differential costs would include only variable costs of the additional output otherwise it would include both variable cost as well as fixed costs of the additional output. Thus, special order is generally considered on the basis of a comparison between the price offered and expected differential cost which is generally equal to variable cost in the short period. If the price is higher than differential cost, the order is accepted otherwise it is rejected.

Illustration: 11.2: Desk Power, a manufacturer of calculators, who has been selling its products through retail shops for a price ₹ 50, has received a special order from a group of educational institutions for supply of 1,000 calculators at a price of ₹ 40. The company is presently operating at 60 per cent of its capacity and has production capacity of 40,000 units. You are approached by the company to guide it in taking right decision. Cost data provided by the costing department of the company is summarized as under:

	₹
Raw material	15
Labour (Direct)	8
Works overheads (70% Variable)	10
Administrative overheads	6
Marketing overheads (50% Variable)	8

Solution: Statement showing differential cost and revenues for the special order

Particulars	*Per Unit*	*Amount*
Raw material	15	15,000
Labour (Direct)	8	8,000
Works overheads	7	7,000
Marketing overheads	4	4,000
Differential Cost	34	34,000

The company should accept this offer even at a price of ₹ 40. By accepting the offer, the company will, on the one hand generate differential revenue of ₹ 4,00,000 (1,000 calculators @ ₹ 40 each) and on the other hand will incur differential cost amounting to ₹ 34,000. The difference between differential revenue and differential cost is ₹ 6,000 which would represent the profit from the additional sales, if the special order is accepted. Therefore, it is recommended that the company should accept the special offer.

Add or Drop Products

Business is not in a world of producing products that once sold will last a life time—ultimate replacement is a vital decision. No company can afford to stand still with its old products. Hence, the ultimate objective of every company should be to come up with new products that will serve the consumer and replace the old products which have become obsolete with the passage of time and in view of consumer likes and dislikes. Thus products and product lines must be developed to satisfy the ever-changing desires of consumers. To ensure growth and prosperity of business in a dynamic market, companies need to drop such products, departments, segments or branches that either have become irrelevant for the business or have lost their commercial viability. However, before taking any action in this regard the company must study the impact of such a decision on future income and profit. Since discontinuity of a firm's product or segment cannot avoid committed cost in the short run, such a decision in the short run demands the study of differential profit effect

of the alternative. In fact, differential analysis is an appropriate technique to help a firm in taking such a decision.

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Illustration 11.3: A computer manufacturing company is considering a proposal to drop desktop brand and replace the said brand by a new product laptop. Total fixed cost for the year 2006 amounts to ₹ 54,88,000 and the other cost and sales details of the various products of the company for the year are given below:

Products	*Cost (Per Unit)* (₹)	*Variable Cost (Percentage)*	*Sales (Per Unit)* (₹)
Desktop	20,000	60	35,000
Laptop	52,000	70	65,000
Interactive Boards	96,000	65	1,40,000

During the year 2006 the company has succeeded in selling 200 desktops, 120 laptops and 60 interactive boards. According to Sales Executive of the company during the past few years the customers have preferred laptops over desktops. To respond to this change, the company is seriously thinking of dropping desktop from its product line and replacing the same by palmtop. In the opinion of Financial Controller the proposal if approved will change the whole equation of sales and profit of the company. The details provided by him in respect of price and sales are given below.

Products	*Estimated Price* (₹)	*Estimated Sales (in units)*
Palmtop	35,000	190
Laptop	65,000	145
Interactive Board	1,40,000	80

Further, the controller believes that the proposed change will not have any impact on cost structure. You are required to examine the proposal and give you opinion about the proposal.

Solution

A. Statement Showing Profit under Existing Product Line

Particulars	*Palmtop* (₹)	*Laptop* (₹)	*Interactive Board*	*Total* (₹)
Sales	70,00,000	78,00,000	84,00,000	2,32,00,000
Less:				
Variable Cost*	24,00,000	43,68,000	37,44,000	1,05,12,000
Contribution	46,00,000	34,32,000	46,56,000	1,26,88,000
Less: Fixed Cost				54,88,000
Profit				72,00,000

B. Statement Showing profit under Proposed Product Line

Particulars	*Palmtop* (₹)	*Laptop* (₹)	*Interactive Board*	*Total* (₹)
Sales	66,50,000	94,25,000	1,12,00,000	2,72,75,000
Less:				
Variable Cost*	22,80,000	52,78,000	49,92,000	1,25,50,000
Contribution	12,80,000	22,62,000	26,88,000	1,47,25,000
Less: Fixed Cost				54,88,000
Profit				92,37,000

Recommendation: The proposed change will enable the company to earn a differential profit of ₹ 20,37,000, therefore, must accept the proposal.

Working:

* Calculation of Variable cost = (Variable cost per unit** × Total unit sold)

Existing Product line:
Desktop = (₹ 12,000 × 200 units) = ₹ 24,00,000
Laptop = (₹ 36,400 × 120 units) = ₹ 43,68,000
Interactive Board = (₹ 62,400 × 60 units) = ₹ 37,44,000

Proposed Product line:
Palmtop = (₹ 12,000 × 190 units) = ₹ 22,80,000
Laptop = (₹ 36,400 × 145 units) = ₹ 52,78,000
Interactive Board = (₹ 62,400 × 80 units) = ₹ 49,92,000

** Calculation of variable cost per unit:

$$\frac{\text{Percentage of variable cost in total cost}}{100} \times \text{Amount of total cost}$$

$$\text{Desktop} = \frac{60}{100} \times ₹20,000 = ₹12,000$$

$$\text{Laptop} = \frac{70}{100} \times ₹52,000 = ₹36,400$$

$$\text{Interactive Board} = \frac{66}{100} \times ₹96,000 = ₹62,400$$

Sell or Process

Generally, a product passes through many stages during its manufacturing process. Consequently, a manufacturer gets the opportunities at different stages in the manufacturing process of a product to decide either to sell it at the intermediate stage of production or process it further and then sell. In deciding about this issue, a manufacturer can use the differential analysis to know differential cost and differential revenue of the next stage in the manufacturing process. If the differential revenue of the next stage of the manufacturing process exceeds the differential cost of the stage, the manufacturer has every reason not to sell the product in the intermediate stage and process it further.

Illustration 11.4: Sana juice manufacturing company produces 20,000 liters of juice in a batch which involves two processes. The details about cost and quantity of the juice for the batch are given below:

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Particulars	*Process I*	*Process II*
Material required	20,000 Kgs	500 Kgs
Material cost per Kg	₹ 5	₹ 2
Labour cost per liter	₹ 12,000	₹ 6,000
Selling price per liter	₹ 10	₹ 12

The output of Process I is used as input for Process II. However, the company has option to sell juice soon after Process I or after Process II. However, due to normal wastage in Process II, the expected output is estimated 18,000 liters. On the basis of above data you are required to help the company in deciding whether to sell soon after the Process I or after Process II.

Solution

Statement of Differential Analysis—Process or Sell

Particulars		*Amount* (₹)
Differential revenue after Process II:		
Revenue from sale of juice after Process II (12 × 18,000)	2,16,000	
Less revenue from sale of juice soon after process	2,00,000	
Differential revenue		16,000
Less differential cost per batch:		
Material (500 × 2)	1,000	
Labour	6,000	
Differential cost		7,000
Differential income from further processing		9,000

The above statement of differential analysis clearly depicts that the company will earn ₹ 9,000 more if it processes further the output of Process I. Therefore, the company should prefer to sell juice after Process II. The students need to remember that in the context of differential analysis, the cost incurred in Process I (₹ 2,20,000) is irrelevant here as the same will be incurred regardless of whether juice is processed further after Process I. Accordingly, such cost has not been considered while taking the decision.

Operate or Shutdown

It is not uncommon to observe that firms are confronted with a situation where they need to address a crucial decision of either to suspend their operations for some time or to close down permanently. In fact, such a decision has serious implications on the future prospects of the business. The decision to shutdown by a firm may result not only in the loss of a part of the market or few customers permanently but also experienced and talented workers. Further, such a decision may have adverse impact on the goodwill of the firm. At the same time, resumption of operation may call for heavy expenditure. Therefore, a firm needs to be careful while making a decision to continue

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operation or shutdown. However, the technique of differential costing can help a firm in this regards by making a comparison between differential revenues under both continued operations and a temporary shutdown. Since it is always better for a firm to continue to operate as long as it generates contribution that can be utilized for the recovery of fixed costs, a firm needs to determine the loss of contribution in case it decides to shutdown and compare the same with the avoidable fixed costs. If the avoidable fixed costs are less than the amount of contribution lost, the firm must decide to continue its operations. However, it will not be in the interest of the firm if the avoidable fixed costs are more than the amount of contribution lost.

Illustration 11.5: ESS Company during the year ended 31st December 2011 sold 1,00,000 units. The cost and revenue details per unit obtained from the records of the company are summarized below:

	₹
Selling price	10
Direct Material	3
Direct labour	2
Selling and distribution costs (Variable)	2

Fixed costs for the year ₹ 1,50,000. The company is expecting a reduction in the sales of the company by 80 per cent in the year 2012 due to overall decline in industry sales. Financial controller of the company suggests to the company to close the plant temporarily till the sales position of the industry improves. The company can avoid 50 per cent of fixed cost if it stops its operation for the next year.

Solution

Statement Showing Contribution from Sales for the Year 2012

Particulars		₹
Sales (20,000 × ₹ 10)		2,00,000
Less: Variable Cost:		
Direct Material (20,000 × ₹ 3)	60,000	
Direct Labour (20,000 × ₹ 2)	40,000	
Selling and distribution costs (20,000 × ₹ 2)	40,000	
		1,40,000
Contribution		60,000
Less fixed costs		1,50,000
Loss		90,000

Comments

The company should not continue its operation as its differential revenue is ₹ 60,000 which will not be sufficient to recover its fixed costs. If the company continues its operations it will suffer a loss of ₹ 90,000 which is more than its avoidable fixed cost i.e., ₹ 75,000 (50 per cent of fixed costs). Therefore, the company must stop operation temporarily.

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Lease or Sell

Since the machinery and equipments used in a business lose their utility with the passage of time, therefore, firms often face situations where they need to decide whether to lease or sell plant and equipment that has lost its commercial viability. Differential analysis can help a firm to evaluate alternatives and identify the best course of action under the given circumstances.

Illustration 11.6: Jelum Textile Company purchased a plant in 1999 for ₹ 16,00,000. The company was depreciating the said plant on straight-line method at 10 per cent and by the end of 2006 the company had an accumulated depreciation of ₹ 11,20,000. In January 2007 the company was considering to dispose of the plant for ₹ 3,20,000 and Chinab Textile Company was ready to pay the said amount. Jelum Textile Company had another option to lease the plant for three years to another company which was ready to pay Jelum Textile Company an amount of ₹ 4,50,000 as rent for the plant. However, the plant shall have no scrap value after three years. During the lease period the maintenance of the plant was responsibility of Jelum Textile Company for which the company was supposed to incur repair and insurance cost of ₹ 50,000. The company decided to sell the plant. You are required to calculate net differential income from lease for the company.

Solution

Statement Showing Differential Gain from the Alternatives

Particulars		₹
Differential revenue from alternatives:		
Revenue from lease	₹ 4,50,000	
Revenue from sales	₹ 3,20,000	
Differential revenue from lease		1,30,000
Less differential cost of lease		50,000
Net differential income from lease		80,000

Expand or Reduce Capacity

In highly dynamic markets, firms need to adjust their production capacity according to the market demands. Therefore, firms have to make expansion or reduction in their production capacities to remain effective in the market. Such a decision involves many issues relating to profit planning, therefore it calls for the use of differential analysis on the part of the decision maker.

Illustration 11.7: Electro Electronics, a manufacturer of calculators is currently producing 7,500 units during a particular period. The following particulars are available:

₹

Selling price per unit	20
Variable cost per unit	10
Fixed costs for the period	45,000

The company intends to expand its production by 2,500 units. To meet the demands of expanded production, the company has to meet an addition fixed cost of ₹ 35,000. You are required to advise the company which alternative is better and why.

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Solution

Statement Showing Contribution under Two Alternatives

Particulars	*Present Position* ₹	*Per Unit* ₹	*Proposed Position* ₹	*Per Unit* ₹
Sales	1,50,000	20	2,00,000	20
Less variable cost	75,000	10	1,00,000	10
Contribution	75,000	10	1,00,000	10
Less fixed costs	45,000	6	80,000	8
Profit	30,000	4	50,000	2

Comments

Although apparently it looks that the company should not go for expansion as such a decision would decrease per unit profit from ₹ 4 to ₹ 2, yet the total profit of the company will increase by ₹ 20,000 by the expansion. Therefore it is recommended that the company must executive its programme of expansion.

Reduce or Maintain Price

In a highly competitive market, pricing is often used as a strategic weapon by the firms to attain organization goals. Consequently, the firms need to change prices frequently to respond to marketing changes. To formulate effective pricing strategies in the competitive markets, firms can make use of differential costing that has tremendous potential to help them in this regard.

Illustration 11.8: Following information has been made available from the cost records of Global Time Limited, manufacturers of clocks:

Particulars	*Total* (₹)	*Per Unit* (₹)
Sales	1,50,000	15
Variable Costs	90,000	9
Contribution (Sales – Variable Costs)	60,000	6
Fixed Costs	25,000	2.50
Profit	15,000	0.50

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With this cost structure and price the company has succeeded to sell 10,000 clocks last year. The company expects intense competition during the current year due to new entrants. To meet the growing demands of the competition, the firm intends to reduce the price by 20 per cent which in the opinion of marketing manager of the firm might increase the existing sales by 30 per cent. You are requested to assess the impact of the proposed action on the existing profits of the firm by employing differential costing.

Solution

Statement Showing Differential Gain from Change in the Price

Particulars	*Existing Position 10,000 Clocks*		*Proposed Position 13,000 Clocks*	
Sales	1,50,000	15	1,56,000	12
Less variable costs	90,000	9	1,17,000	9
Contribution	60,000	6	39,000	3
Less fixed costs	25,000	2.5	25,000	1.92
Profit	35,000	3.5	14,000	1.08

Illustration 11.9: Auto Parts Ltd. has an annual production of 90,000 units for a motor component. The component's cost structure is as below:

	Per Unit (₹)
Materials	270
Labour (25 per cent fixed)	180
Expenses:	
Variable	90
Fixed	135

(a) The purchase manager has an offer from a supplier who is willing to supply the component at ₹ 540. Should the component be purchased and production stopped?

(b) Assume the resources now used for this component's manufacture are to be used to produce another new product for which the selling price is ₹ 485.

In the latter case, material price will be ₹ 200 per unit. For labour and expenses, 90,000 units of this product can be produced at the same cost basis as above. Discuss whether it would be advisable to divert the resources to manufacture the new product, on the footing that the component presently being produced would, instead of being produced, be purchased from the market.

(CA, Inter)

Solution

(a) Statement Showing the Cost of the Component in Make or Buy

Particulars of Variable Cost	*Per Unit (₹)*	*Total for 90,000 Units (₹)*
(I) Total Variable Cost in case of manufacturing: Material: ₹ 270 + Labour: ₹ 135 + Expenses: ₹ 90 = ₹ 495	495	445,50,000
(II) Purchase Price of the Component	540	486,00,000
Extra amount to be spent in case of the purchase	45	40,50,000

Since in case of purchase of the component from the market, the company has to bear extra cost of ₹ 45 per unit which comes to ₹ 40,50,000 for 90,000 units, therefore it is not viable for the company to purchase the component rather the company should continue its production.

(b) Statement Showing the Contribution if the Existing Resources are Diverted to Produce another Component

Particulars		*Per Unit (₹)*
Selling price		485
Less: Materials	₹ 200	
Labour (variable)	₹ 135	
Expenses (variable)	₹ 90	425
Contribution		60
Loss in case of purchase of the component (Excess of purchase over variable cost): (₹ 540 – ₹ 495)		45

From the analysis of the above statement, it is clear that the company can save ₹ 15 (i.e., ₹ 60 – ₹ 45) per unit in case it decides to divert its resources to produce another component. Accordingly, the company is advised to divert its resources to manufacture new product. By doing so, the company can save ₹ 13,50,000 (i.e., ₹ 15 × 90,000 units).

Illustration 11.10: The costs per unit of three products X, Y, and Z are given below:

Products	*X* (₹)	*Y* (₹)	*Z* (₹)
Direct material	60	48	54
Direct labour	36	42	36
Variable overheads	24	30	18
Fixed expenses	18	18	12
	138	138	120
Profit	54	42	36
Selling price	192	180	156
No. of units produced	30,000	15,000	24,000

Production arrangements are such that if one product is given up the production of the others can be raised by 50 per cent. The directors propose

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that product Z should be given up because the contribution from the product is the lowest. Present suitable analysis of the data indicating whether the proposal should be accepted. (Adapted, B.Com, Hons Delhi)

NOTES

Solution

Statement Showing Profit after Discontinuation of Product Z

Particulars	*Amount* (₹)
Sales:	
Product X (45,000* × ₹ 192) = 86,40,000	
Product Y (22,500* × ₹ 180) = 40,50,000	
	126,90,000
Less: Variable costs	
Product X (45,000 × ₹ 120) = 54,00,000	
Product Y (22,500 × ₹ 120) = 27,00,000	
	81,00,000
Contribution	45,90,000
Less: Fixed cost[2]	10,98,000
Profit	34,92,000

The profit of the organization will increase by ₹ 3,78,000, i.e., (₹ 34,92,000 – ₹ 31,14,0002) if the proposal is accepted. Therefore, it is recommended that the proposal should be accepted.

Working:

*(a)	Present sales of Product X	=	30,000 units
	Add 50% increase due to drop of product z	=	15,000 units
			45,000 units
(b)	Present sales of Product Y	=	15,000 units
	Add 50% increase due to drop of product z	=	7,500 units
			22,500 units

1. Calculation of fixed cost:

X: (30,000 × ₹ 18)	=	₹ 5,40,000
Y: (15,000 × ₹ 18)	=	₹ 2,70,000
Z: (24,000 × ₹ 12)	=	₹ 2,88,000
		₹ 10,98,000

2. Calculation of Present profit:

X: (30,000 × ₹ 54)	=	₹ 16,20,000
Y: (15,000 × ₹ 42)	=	₹ 6,30,000
Z: (24,000 × ₹ 36)	=	₹ 8,64,000
		₹ 31,14,000

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Illustration 11.11: Modern Sewing Machines Co. manufactures hand-operated sewing machines. Prepare a schedule showing the differential costs and incremental revenue at each stage from the following data. At what volume should the company set its level of production?

Output (No. in Lakh)	*Selling Price Per Machine (₹)*	*Total Semi-fixed Cost (₹ in Lakh)*	*Total Variable Cost (₹ in Lakh)*	*Total Fixed Cost (₹ in Lakh)*
0.60	240	30	83.6	28.4
1.20	220	30	163.6	28.4
1.80	200	34	255.6	28.4
2.40	180	34	315.6	28.4
3.00	160	40	355.6	24.4
3.60	140	40	380.6	28.4

(ICWA, Final)

Solution

Schedule Showing the Differential Costs and Incremental Revenue

Output (No. in Lakh)	*Selling Price Per Machine (₹)*	*Sales Value (₹ in Lakh)*	*Incremental Revenue (₹ in Lakh)*	*Semi-fixed Cost (₹ in Lakh)*	*Variable Cost (₹ in Lakh)*	*Fixed Cost (₹ in Lakh)*	*Total Cost (₹ in Lakh)*	*Differential Cost (₹ in Lakh)*
0.60	240	144.0	–	30	83.6	28.4	142.0	–
1.20	220	264.0	120.0	30	163.6	28.4	222.0	80.0
1.80	200	360.0	96.0	34	255.6	28.4	318.0	96.0
2.40	180	432.0	72.0	34	315.6	28.4	378.0	60.0
3.00	160	480.0	48.0	40	355.6	24.4	424.0	46.0
3.60	140	504.0	24.0	40	380.6	28.4	449.0	25.0

It is a usual business practice to increase the output as a long incremental revenue is more than its differential cost and vice versa. In the present case, the differential cost is less than incremental revenue up to a level of 3.00 lakh units; beyond this level differential cost is more than incremental revenue. Therefore the company must set its output level at 3.00 lakh units.

Illustration 11.12: Quality Product Limited has drawn up the following budget for the year 2012–13.

	₹
Raw materials	20,00,000
Labour, stores, power and other variable costs	6,00,000
Fixed manufacturing overheads	7,00,000
Packing and variable distribution cost	4,00,000
Fixed general overheads including selling	3,00,000
	40,00,000
Sales revenue @ ₹ 50 per unit	50,00,000
	10,00,000

NOTES

The general manager suggests to reduce selling price by 5 per cent and except to achieve an additional volume of 50 per cent. The more intensive manufacturing programme will involve additional costs of ₹ 50,000 for production planning. It will also be necessary to open an additional sales office at the cost of ₹ 1,00,000 per annum.

The sales manager, on the other hand, suggests to increase selling price by 10 per cent which it is estimated will reduce sales volume by 10 per cent. At the same time a saving in manufacturing overheads and general overheads of ₹ 50,000 and ₹ 1,00,000 per annum respectively is expected on this reduced volume.

Which of these two proposals would you accept and why? Show complete working.

(B.Com, Hons., Delhi University)

Solution

Statement Showing Profit from the Proposals

Particulars	**(I)** *Proposal of General Manager*		**(II)** *Proposal of Sales Manager*	
	Amount (₹)	*Amount* (₹)	*Amount* (₹)	*Amount* (₹)
Sales:				
Proposal I: (1,05,000[2]		49,87,500		
Units × ₹ 47.50[2])				49,50,000
Proposal II: (9,000[2]				
units × ₹ 55[2])				
Proposal	21,00,000		18,00,000	
Less: Variable Cost:	6,30,000		5,40,000	
Raw materials[3]	4,20,000	31,50,000	3,60,000	
Labours, stores, power				27,00,000
and other variable cost[4]		18,37,500		22,50,000
Packing and variable		11,15,000		8,50,000
distribution cost[5]				
		7,22,500		14,00,000
Contribution				
Less: Fixed Cost[6]				
Profit				

Recommendation: A study of the above statement reveals that proposal of sales manager has more profit potential, therefore, it is recommended that the same should be considered.

Working:

1. Calculation of new sales volume:
   Proposal I: 1,00,000* units + 5% = 1,05,000 units
   Proposal II: 1,00,000*units + 10% = 90,000 units
   * Existing sales value ÷ Existing revenue per unit = ₹ 50,00,000 ÷ ₹ 50 = 1,00,000 units

2. Calculation of new sales value:

   Proposal I: (1,05,000 units × ₹ 47.50 *i.e.*, ₹ 50 – 5%)= ₹ 49,87,500

   Proposal II: (90,000 units × ₹ 55.00 *i.e.*, ₹ 50 + 10%)= ₹ 49,50,000

3. Calculation of Material for proposals I & II:

   Proposal I: ₹ 20,00,00 ÷ 1,00,000 units × 1,05,000 units = ₹ 21,00,000

   Proposal II: ₹ 20,00,00 ÷ 1,00,000 units × 90,000 units = ₹ 18,00,000

4. Calculation of Labour and others for proposals I & II:

   Proposal I: ₹ 6,00,00 ÷ 1,00,000 units × 1,05,000 units = ₹ 6,30,000

   Proposal II: ₹ 6,00,00 ÷ 1,00,000 units × 90,000 units = ₹ 5,40,000

5. Calculation of parking and others for proposals I & II:

   Proposal I: ₹ 4,00,00 ÷ 1,00,000 units × 1,05,000 units = ₹ 4,20,000

   Proposal II: ₹ 4,00,00 ÷ 1,00,000 units × 90,000 units = ₹ 3,60,000

6. Calculation of Fixed cost for proposals I & II:

Proposal I: Present ₹ 7,00,00 + ₹ 3,00,000	=	₹ 10,00,000
Add: Additional cost (1,00,000 + ₹ 15,000)	=	₹ 1,15,000
Total fixed Cost	=	₹ 11,15,000
Proposal II: Present ₹ 7,00,00 + ₹ 3,00,000	=	₹ 10,00,000
Less: Saving in fixed cost	=	₹ 1,50,000
Total fixed Cost	=	₹ 8,50,000

Illustration 11.13: Sports specialists Ltd. are famous for specialized manufacture of quality chess boards sets. Presently, the company is working below its normal capacity of 1,000 units per month. The company sells chess boards sets in the national market at ₹ 150 per unit. During April 2012, 600 units were sold which is the regular sales volume for each month all through the year.

The unit cost of production is

Direct material	₹ 60
Direct labour	₹ 30
Factory overhead	₹ 30
Selling and administration overheads	₹ 15

The company received an export order on 20-4-2012 for supply of 600 units to be dispatched by 30-6-2012. However, the order stipulates the price per unit as ₹ 100 only. The cost analysis indicated that the cost of direct material and direct labour that are to be incurred on the export order would be the same amount per unit as the regular one of production. However, an amount of ₹ 2,000 will have to be incurred on special packing, labeling, get

up, etc. No additional factory, selling or administrative overhead costs would be incurred in executing the export order since the firm is operating below normal capacity.

NOTES

Using differential cost analysis method, prepare the income statement for May and June 2012 to show whether the acceptance of the export order would be profitable to the company. Assumptions and comments, if any, may be given separately.

Solution

Income Statement for May and June 2002

Particulars	*Existing Position (1,200 Units) (₹)*	*Export Order Differential (600 Units) (₹)*	*Proposed Position with Export Order (1,800* Units) (₹)*
A. Sales:			
Existing position (1,200 units × ₹ 150)	1,80,000		
Export order (600 units × ₹ 100)		60,000	
Proposed position (₹ 1,80,000 + ₹ 60,000)			2,40,000
B. Costs:			
Direct materials @ ₹ 60 per unit	72,000	36,000	1,08,000
Direct labour @ ₹ 30 per unit	36,000	18,000	54,000
Factory overhead @ ₹ 30 per unit	36,000	–	36,000
Special packing, labelling, etc.	–	2,000	2,000
Selling & Adm. Overhead @ ₹ 15 per unit	18,000	–	18,000
Total	1,62,000	56,000	2,18,000
Profit (A – B)	18,000	4,000	22,000

* Units for proposed position have been worked out as under:

600 units for two months = (600 × 2) = 1,200 units + 600 unit of export order = 1,800 units

Assumptions and Comment: The items like factory overhead and selling and administrative overhead are irrelevant for the decision as they do not change with the proposed change in the output. Further, the company should accept the order as it has unutilized capacity, i.e., 800 units for the months of May and June. The company should accept the proposal as it would earn an additional profit of ₹ 4,000 from it.

Check Your Progress

3. How are special order items considered under differential costing?
4. What is the condition of differential cost under which a firm must decide to continue its operation or shut it down?

11.5 ANSWERS TO CHECK YOUR PROGRESS

NOTES

1. Differential costing is perspective in nature whereas marginal costing is generally historical in nature.
2. A number of tools and techniques are available with management accountants for evaluation of alternatives like profit planning, capital budgeting, risk techniques, linear programming, decision tree and forecasting techniques.
3. Special order is generally considered on the basis of a comparison between the price offered and expected differential cost which is generally equal to variable cost in the short period. If the price is higher than differential cost, the order is accepted other it is rejected.
4. If the avoidable fixed costs are less than the amount of contribution lost, the firm must decide to continue its operations. However, it will not be in the interest of the firm if the avoidable fixed costs are more than the amount of contribution lost.

11.6 SUMMARY

- Differential costing refers to a costing technique that examines the effects of alternative courses of action on total costs.
- The concept of differential costing is based on total cost which is not true of marginal costing that considers only direct/variable costs and ignores fixed cost in its application.
- Differential costing is perspective in nature whereas marginal costing is generally historical in nature.
- Under marginal cost per unit does not change despite the change in the range of production.
- Under differential costing the cost per unit may change with a change in range of production.
- The set of tools used in differential costing for performance evaluation is different than recommended by marginal costing.
- Differential costing is applicable to an additional volume of production whereas marginal costing is used for additional units.
- Relevant cost represents the amount of difference in terms of cost between several alternative courses of action that are under consideration of a decision-maker.
- Relevant costs are future costs and not the ones that have already been incurred.

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- Relevant costs are bound to change as a result of alternative course of action.
- The costs that remain constant between different alternatives do not fall within the scope of relevant costs.
- Decision making is the process of making choices between alternative courses of action.
- Every rational decision making process begins with the identification of the problem.
- Every problem calls for an in-depth study as generally the problems are characterized by 'ice-berg' principle where a little portion is visible and the major portion is hidden about which the decision-maker has no clue.
- Although a number of tools and techniques like lateral thinking, digging a hole elsewhere, and morphological approach have been developed over the year to help decision-makers in developing alternatives yet such an attempt calls for lot of effort on the part of decision-makers in terms of continuous research and thinking.
- To evaluate decision alternatives in their right perspectives, a management accountant needs to possess knowledge about a number of tools and techniques like profit planning, capital budgeting, risk techniques, linear programming, decision tree, and forecasting techniques.
- The choice of the best alternative is simply accomplished by selecting the alternative which best meets the chosen criterion.
- After the plans and programmes have been implemented to attain the desired outcome of the decision, a decision-maker has to evaluate the actual performance with a purpose to find how actual results reconcile with the desired outcomes.
- Differential costing has tremendous potential as a decision making tool.

11.7 KEY WORDS

- **Differential costing:** It is a costing technique that examines the effects of alternative courses of action on total costs.
- **Relevant costs:** It refers to the costs that are pertinent to the decision which is under the consideration of a decision-maker.
- **Decision making:** It is the process of making choices between alternative courses of action.

11.8 SELF ASSESSMENT QUESTIONS AND EXERCISES

NOTES

Short-Answer Questions

1. Explain the concept of 'Differential Costing'.
2. What is significance of differential cost as a tool for decision making tool in short period.
3. Differentiate between differential costing and marginal costing. Discuss also similarities among the two approaches of costing.
4. What do you understand by 'Differential cost'? Discuss the characteristics of such a cost.

Long-Answer Questions

1. Identify and examine the steps involved in decision making process.
2. Examine and discuss the areas of business where differential costing can serve as tool fool for decision making.
3. Double Exx Limited, a manufacturer of rubber sheets, is currently operating at 75 per cent of its producing capacity. The company is considering a proposal to enhance its current operation from 7,500 units to 9,000 units. The details of cost and sales per unit obtained from the accounts of the company are given below:

	₹
Selling price	12
Direct Material	4
Direct labour	3
Expenses (60 per cent Variable)	3

You are required to determine the differential cost of additional output of 1,500 units.

4. A company is considering a proposal whether to buy or manufacture an item that is presently manufactured internally and used as a component by the company for its produce. The existing cost structure of the item is given below:

	***Per unit* (₹)**
Materials	20
Labour (Direct)	10
Expenses (40 per cent fixed)	6

The component is available in the market for ₹ 29. You are requested to advise the company whether it should continue the manufacturing of the component or it should purchase the same from the market.

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5. A company has received an order from a foreign buyer to supply 2,000 units at a price ₹ 90. The company which is currently operating at 60 per cent operating capacity produces 10,000 units. The cost sheet for the existing output of the company is given below:

	₹	₹
Direct materials		5,00,000
Wages		3,00,000
Fixed overheads:		
Variable	1,00,000	
Fixed	2,00,000	
		3,00,000
Selling and distribution overheads:		
Variable	2,00,000	
Fixed	3,00,000	
		5,00,000

The selling price (per unit) of the existing output is ₹ 200. You are required to advise the company whether to accept or reject the order.

11.9 FURTHER READINGS

Sahaf, M. A. 2010. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

BLOCK - IV
METHODS OF CAPITAL BUDGETING

NOTES

UNIT 12 CAPITAL BUDGETING: MEANING AND IMPORTANCE

Structure

12.0 Introduction
12.1 Objectives
12.2 Capital Budgeting: Meaning
  12.2.1 Importance
  12.2.2 Steps in Capital Budgeting Process
  12.2.3 Objectives of Capital Budgeting Programmes
  12.2.4 Kinds of Proposals
  12.2.5 Appraisal Methods
12.3 Answers To Check Your Progress
12.4 Summary
12.5 Key Words
12.6 Self Assessment Questions and Exercises
12.7 Further Readings

12.0 INTRODUCTION

The decisions regarding the procurement of fixed assets not only have strategic implications for any business but also involve huge initial investment. Since the investment in such assets is usually of substantial magnitude and the benefits or services received in the form of cash flows *from* their acquisition usually extend over a fairly long period of time, companies need to pay serious attention over the budgeting of such expenditures. For a big commercial enterprise, it may entail millions of rupees spent annually on infrastructure facilities whereas for a smaller commercial concern, it might entail the occasional purchase for one machine costing several thousands of rupees. Extensive research and analysis are required to aid the management in making a decision to commit these large sums which it is assumed will be returned in greatly reduced installments over many accounting periods. In fact, the success of any commercial enterprise depends largely upon efficient utilization of the fixed assets. Consequently, such decisions are subject to a systematic evaluation process which is known as *capital budgeting*.

12.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the meaning and importance of capital budgeting
- Describe the steps involved in the capital budgeting process

NOTES

- Examine the objectives and types of proposals in capital budgeting
- Discuss the appraisal methods

12.2 CAPITAL BUDGETING: MEANING

Capital expenditure decisions are not only recognized as being most critical for the success of business but also subject to a systematic evaluation process technically referred to as capital budgeting. Capital budgeting refers to the practice of allocating money, on a regular basis, to be used for acquiring capital assets. It is a decision making process used by firms to analyse the purchase of major fixed assets which may include both tangible assets like building, machinery, plant and equipment and intangible assets like technology, patents and trademarks. Commenting on the nature and scope of capital budgeting, Bierman and Smidt (2006), state that capital budgeting is *a many-sided activity that includes searching for new and more profitable investment proposals, investigating engineering and marketing considerations to predict the consequences of accepting the investment, and making economic analyses to determine the profit potential of each investment proposal*. Thus, capital budgeting is concerned with the process of planning and controlling major expenditure on projects with lives extending beyond one year.

To the author of this book, capital budgeting is *a process of long-range planning expenditure for acquiring such assets which not only require significant investment but also generate cash flows beyond one year. It is investment decision making that aims to evaluate the financial desirability of a project with the help of cash flows rather than net income as advocated by accrual accounting.* Capital budgeting is primarily the planning and control of expenditure for capital assets, such as:

- replacement of existing assets to meet growing demands of the changing environment in general and competition in particular;
- acquisition of new equipment, building or facilities with the aim to expand existing operations;
- developing new types of production methods and technologies like automating production system;
- responding to some change in legal, operating and safety environment; and
- developing the firm's commercial websites.

Exhibit 12.1 Popular Definitions on Capital Budgeting

Weston and Brigham (1969): Capital budgeting involves the entire process of planning expenditures whose returns are expected to extend beyond one year. The choice of one year is arbitrary, of course, but is a cut-off point for distinguishing among the various kinds of expenditures.

John J. Hampton (1980): Capital budgeting describes the firm's formal planning process for the acquisition and investment of capital and results in a capital budget that is the firm's formal plan for the expenditure of money to purchase fixed assets.

G.C. Philippatos (1973): Capital budgeting is concerned with the allocation of the firm's scare financial resources among the available market opportunities. The consideration of investment opportunities involves the comparison of the expected future stream of earnings from a project, with the immediate and subsequent stream of expenditures for it.

Sidney Davidson and Others (1983): The process of choosing investment projects for an enterprise by considering the present value of cash flows and deciding how to raise the funds required by the investment.

12.2.1 Importance

Although the high quantum of investment accompanied by higher risk in capital projects are generally advocated as the basic reasons for the application of the capital budgeting process, yet *Moore* and *Jaedicke* (1980), state that capital investment decisions call for increased attention of the firms because:

- substantial sums of money are usually invested in capital projects;
- the resources that are invested in a project are often committed for a long period of time;
- it may be difficult to reverse the effects of a poor decision;
- the success or failure of the company may depend upon a single or relatively few investment decisions;
- plans must be made well into an uncertain future.

12.2.2 Steps in Capital Budgeting Process

A systematic process of capital budgeting consists of the following five steps (see Figure 12.1):

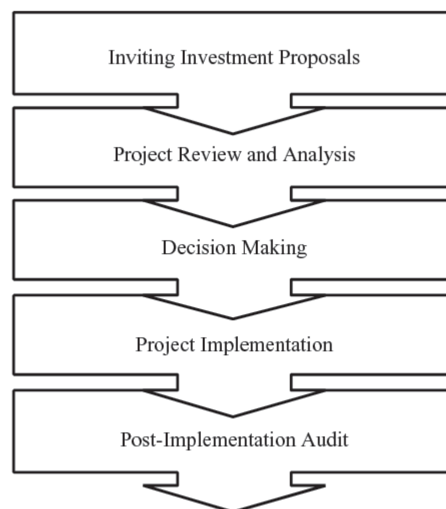


Fig. 12.1 *Process of Capital Budgeting*

Inviting Investment Proposals

The capital budgeting process begins with invitation of proposals from various departments of the organization. The step, in fact, provides organizations the opportunities for investment. Project proposals need to be designed in tune with a firm's strategic plan to ensure a perfect match between corporate objectives and intended outcome of the proposals. In fact, investment opportunities created by the project proposals must contribute to a firm's corporate goals. Such a contribution would help the organization to assess the strategic significance of the investment. To have sufficient and effective project proposals, a firm must encourage, appreciate and reward the departments to submit project proposals that are effective both strategically and profitably.

Project Review and Analysis

This step involves preliminary project screening and financial and commercial viability of the projects. The number of project proposals received from the departments is usually much higher than a firm's available resources for investment. Due to limited resources, it is not possible for a firm to consider all identified projects for investment. Consequently, a firm needs to devise some criterion that would help a firm in identifying the most viable proposals for investment. The criterion generally used for this purpose is based on quantitative measures which are highly influenced by the evaluators' judgements based on their intuitive feeling and experience. Once the project qualifies the preliminary screening process, it is subject to financial analysis which examines the potential of an investment in contributing to the performance of a firm. The techniques used for such an analysis have been discussed in the next unit. However, the financial analysis involves quantitative analysis to predict future cash flows from the projects. The process of forecasting cash flows is considered crucial for investment decision making process.

Decision Making

The third step in the process will be decision making. On the basis of the nature and scope of capital projects, a firm may have to deal with the following three types of decisions:

- Mutually Exclusive Project Decision In many business situations, a firm needs to choose one appropriate alternative among two or more alternatives associated with a capital project. For example, a university may have to choose between conventional and e-admission systems for enrolling the students in its MBA programme with different cost structures and resources. The decision of the university to admit students for the programme through one system would eliminate the use of the other system. Both the systems may be effective and efficient

in their own ways but the university can't accept both. The university needs to choose one that in its opinion is the most efficient and effective. Such situations fall within the scope of *mutually exclusive projects* where a firm has to choose one of the several alternatives projects. In case of such projects, the firms need to rank projects in terms of their defined criteria for the purpose so that the most appropriate project is identified and selected.

- Independent Project Decision It may not be uncommon for firms to find such situations where the choice of one project does not eliminate the possibility of acceptance of another; as such projects do not compete with each other. Such projects are technically referred to as *independent projects*. For example, a university may be considering proposals to establish its campuses in all different states of northern India. It could choose to establish campuses either in all the states of northern India, or to some states, or to none. Such projects, in fact advocate the philosophy of the *accept-reject approach* to making decisions. The decision makers would accept all proposals that could meet their objectives and reject the ones that fail to do so.
- Capital Rationing Decision Although independent projects are not mutually exclusive, yet firms may have to rank them for the purpose of capital rationing. Generally, firms have more proposals for capital investments than they actually can finance. Consequently, they have to rank the capital investment proposals with an aim to identify the most profitable ones that can be actually financed from available resources. The process used for the purpose, technically referred to as **capital rationing,** actually ranks the projects on the basis of predetermined rate of return. The process of capital rationing involves the following two steps:
  - o Ranking of proposals from highest to lowest priority; and
  - o Selection of cut-off point. Proposals above the cut-off are taken up while as below it, are rejected. The selection of cut-off point is an important decision which is taken after due consideration to the number of factors like the goals of the firm and available financial resource.

Project Implementation

After the project has qualified evaluation stage, it needs to be implemented. This involves expenditures that are incurred for the execution of the project. The implementation of the project may call for the active participation of various functional departments of a firm. A firm must monitor implementation of the project constantly with an aim not only to identify operational problems but also to suggest solutions for such problems.

Post-Implementation Audit

The last step in the capital budgeting process involving evaluation of the performance of the project after its implementation. This step helps a firm not only to assess the success of project implementation but also to help future planning and strategy.

FORMAT OF CAPITAL BUILDING

A specimen of capital budget is given as under:

	________ Co. Ltd.	
Date		Proposal No.......................
To Capital Expenditure Committee		
From		Division/Section
	Request to the Committee	(₹)
1. *Introduction:*		
2. *Need/Importance of the project:*		
3. *Duration of the project:*		
4. *Timing:*		
(a) Commencement		
(b) Completion		
5. *Proposed expenditure:*		
(a) Cost of assets	₹ xxxxxxxx	
(b) Freight and delivery charges	₹ xxxxxxxx	
(c) Cost of installation	₹ xxxxxxxx	
(d) Misc. expenses	₹ xxxxxxxx	
Total Cost		xxxxx
6. *Increase in earnings (estimated):*		xxx
7. *Scheduled profitability:*		
(a) Internal rate of return		
(b) Payback period		
(c) Discounted payback period		
(d) Accounting rate of return		
8. *Remarks of capital expenditure committee:*		
No		
Dated		Chairman of the Committee

12.2.3 Objectives of Capital Budgeting Programmes

The main objectives of a capital budgeting programme are summarized below:

- Evaluate the relative worth of capital projects and rank them in order of preferences;

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- Ensure efficient control over large investments and expenditures;
- Provide for cash needs for meeting capital project programmes;
- Analyse the impact of capital expenditure on profitability of the enterprise;
- Facilitate long-range planning; and
- Fix priorities on expenditure by using the techniques of capital rationing at the time of shortage of capital, and thereby, make optimum use of available resources.

12.2.4 Kinds of Proposals

Capital budgeting process includes several different proposals. It differs from firm to firm. However, the most common ones are:

- expansion;
- replacement;
- choice of equipment; and
- buy or lease.

Expansion: The question of expansion may include whether to build or purchase a new plant, or build or buy a new factory. This decision is concerned with the estimation of cost which will be incurred and the receipts which will be earned from a specific project if undertaken.

Replacement: Replacement programmes are essential for the overall growth and development of a company because rapid technological change has become a permanent feature of corporate life. To remain effective in a changing business environment, the firms have to introduce new capital equipments. Consequently, firms have to look for competitive advantages through a systematic approach to the replacement programme. However, little attention is paid by the management to replacement decisions as indicated by various research studies conducted in this area.

The management has to evaluate profitability of replacement investment. Such an evaluation should be based on an in-depth study of all cost and savings involved. The study must be carefully made so that no factor is overlooked. Firms often use same evaluation process for replacement decisions which they use for expansion decisions. This is not a healthy sign because the analysis of these two decisions differs with each other.

The analysis of replacement decision differs from expansion decision in the sense that in the latter emphasis is on calculation of costs and estimation of earnings over a number of years to come whereas in the former the problem is to be decided whether to replace a machine at present or at a future date.

Choice of Equipment: It is concerned with decision of purchase of specific items of equipment in order to produce a new product. The rate of return on investment will govern the purchase of equipment.

Buy-or-lease: A choice is made whether to purchase or lease the required equipment or building. In case of leased asset, a series of payments are made after every specific period in the shape of rent. Thus, payments are spread over a series of annual rental payments. Since the firm has to make payments in installments, it has practically very less immediate financial burden. However, the amount of rent over the life of the asset may exceed its cost price. This is the only serious limitation to this system. In case of purchased assets, a huge initial capital is required, which eliminates the initial payment at specific intervals of time. Number of techniques are used to decide about buy-or-lease facility. The most valuable and commonly used among them is discounted cash flow analysis. The resultant net cash inflow will differ not only in total amount but also in their distribution over time, and by discounting these inflows at an appropriate interest rate, management can discern whether it is profitable to buy or lease. The present worth of the inflows resulting from leasing and buying are compared and the higher present worth will indicate the preferable course, at least from the financial viewpoint. If the present worth of inflows is about the same for buy-or-lease, management can put financial considerations aside and make its choice on the basis of factors such as greater flexibility and freedom from responsibility achieved through renting, or better control and the possibility of a capital gain achieved through buying (Arustein, 1976).

A pivotal factor in buy-or-lease is the interest rate at which the future inflows are discounted. In essence, this should be the rate at which the company can or does borrow long-term funds. Some experts argue that cash inflows in buy-or-lease analysis should be discounted at the minimum rate of return expected by the company.

Leasing has become a commonly accepted method of obtaining practically any type of equipment used by the firms. Unfortunately there is no easy rule of thumb which can be applied to determine when a leasing arrangement might make economic sense. Each leasing transaction must be evaluated in the light of the company's financial condition and the terms of the lease. The advantages attributed to leasing rather than buying equipment are numerous, often redundant, and usually unclear. However, the advantages of convenience often attributed to leasing are purely subjective and cannot by themselves be scrutinized through quantitative analysis. This does not mean that subjective arguments in favour of leasing are meaningless, but rather that a potential lessee should accurately quantify what it costs to obtain the convenience of lease financing or what is saved by sacrificing the prestige of equipment ownership.

12.2.5 Appraisal Methods

Corporate investment decisions involve the application of a suitable technique for the financial evaluation of investment proposals. The basic approach in any technique for the evaluation of capital project involves comparison of

costs and benefits associated with the investment plan. Some methods define costs and benefits in terms of accounting profits and some others consider cash flows in cost-benefit analysis. The firm has to select the right method of evaluation, from among many available ones.

Various methods of evaluation of the capital budget have been in practice defi ned by needs and situations. Some methods, which aim at measuring shareholder wealth creation, have evolved over a period through academic contributions by many authors and researchers. The list of various methods and their variants are:

1. Accounting Method: Accounting Rate of Return (ARR)
2. Cash flow Methods
   (a) Non-discounted Methods: Pay Back Period, Reciprocal of PBP, Life PBP, Modified Payback Period
   (b) Discounted Cash flow methods: Net present value method, Discounted PBP, Profitability Index, Uniform Annual Series, Net terminal Value, Share Price Appreciation Rate, Internal Rate of Return, Terminal Rate of Return
   (c) Special Discounted Methods: Economic Rate of Return, Social Rate Return

You will learn about the major methods in the next unit.

Check Your Progress

1. How are decisions made for mutually exclusive projects?
2. State the difference between the expansion and replacement proposal in capital budgeting.
3. What is the most commonly used technique for decisions regarding buy-or-lease decision?

12.3 ANSWERS TO CHECK YOUR PROGRESS

1. In case of mutually exclusive projects, the firms need to rank projects in terms of their defined criteria for the purpose so that the most appropriate project is identified and selected.
2. The analysis of replacement decision differs from expansion decision in the sense that in the latter emphasis is on the calculation of costs and estimation of earnings over a number of years to come whereas in the former the problem is to be decided whether to replace a machine at present or at a future date.
3. The most valuable and commonly used technique for decisions regarding buy-or-lease decision is discounted cash flow analysis.

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12.4 SUMMARY

- Capital expenditure decisions are not only recognized as being most critical for the success of business but also subject to a systematic evaluation process technically referred to as capital budgeting.
- Capital budgeting is a process of long-range planning expenditure for acquiring such assets which not only require significant investment but also generate cash flows beyond one year. It is investment decision making that aims to evaluate the financial desirability of a project with the help of cash flows rather than net income as advocated by accrual accounting.
- A systematic process of capital budgeting consists of the following five steps: inviting investment proposals, project review and analysis, decision making, project implementations and post-implementation audit.
- Three types of decisions a firm may have to deal with include mutually exclusive project decision, independent project decision and capital rationing decision.
- Different proposals process includes expansion, replacement, choice equipment and buy or lease.
- Different capital expenditure appraisal methods include accounting, cash flow and discounted cash flow methods.

12.5 KEY WORDS

- **Capital budgeting:** It refers to the practice of allocating money, on a regular basis, to be used for acquiring capital assets.
- **Capital rationing:** It is a technique in which projects are ranked on the basis of predetermined rate of return.

12.6 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Mention some of the capital assets the planning and control of whose expenditure is done through capital budgeting.
2. Why do capital investment decisions call for increased attention?
3. List the steps involved in capital rationing.
4. What are the objectives of capital budgeting programmes?
5. Write a short note on different capital budgeting appraisal methods.

Long-Answer Questions

1. Describe the steps in the capital budgeting process.
2. Illustrate a format of capital budget and discuss the kinds of proposals under the capital budgeting process.

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12.7 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

UNIT 13 APPRAISAL METHODS

Structure

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13.0 Introduction
13.1 Objectives
13.2 Methods of Evaluation or Appraisal
13.3 Non-discounted Cash Flow Method
  13.3.1 Payback and Payback Reciprocal Method
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  13.4.3 Profitability Index
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13.7 Summary
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13.10 Further Readings

13.0 INTRODUCTION

Different approaches are used for evaluating relative worth of alternative investment projects which include both qualitative and quantitative analysis. Qualitative analysis may recognize non-monetary factors like social benefits, quality, safety, flexibility, and the like in the evaluation of capital proposals. Quantitative analysis determines the worth of investment projects on the basis of monetary factors like investment, rate of return, economic life, income tax, etc. To deal with this rather mixed situation, commercial concerns utilize one of the sound approaches for determining the relative or absolute profitability of all capital proposals that are up for consideration. Having made these computations, proposals are listed in the descending order of profitability.

13.1 OBJECTIVES

After going through this unit, you will be able to:

- Explain the Payback period and Accounting rate of return methods
- Discuss the Discounted cash flow methods including Net present value, Profitability index and Internal rate of return

13.2 METHODS OF EVALUATION OR APPRAISAL

Many different techniques have been developed to help executives in the evaluation of capital projects. Such techniques range from those that represent rough approximations to those that are relatively precise. Some techniques

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take the time value of money into account while others ignore it in the process of evaluation. The methods that do not take the time value of money into account are simple to use because they do not involve present value computation. Accordingly, evaluation techniques can be broadly classified into two general categories, namely:

- Non-discounted cash flow methods
  - payback
  - payback reciprocal and
  - accounting rate of return.
- Discounted cash flow methods
  - net present value
  - internal rate of return and
  - profitability index.

13.3 NON-DISCOUNTED CASH FLOW METHOD

In this section, you will larn about non-discounted cash flow method.

13.3.1 Payback and Payback Reciprocal Method

Payback method which is not only one of the oldest methods but also most popular method of evaluating investment proposals involves the calculation of the span of time required to recover initial cash investment. In fact, it determines the payback period which is the length of time that elapses before total cumulative cash inflows (after tax before depreciation) from the project equal the initial cash outlays for the project. The formula for the payback period is as under:

$$\text{Payback period} = \frac{\text{Cost of investment}}{\text{Annual cash inflows}}$$

Thus, the computation of payback period requires information like initial cost of the project (investment) and net cash inflows from the investment. The net cash inflows represent the amount of profit after tax but before depreciation.

Assume that investment (project cost) of ₹ 4,00,000 is expected to produce annual returns (cash inflows) of ₹ 50,000 for ten years. No salvage recovery is expected from the investment at the end of the ten years. The initial investment will be recovered in eight years, as calculated below:

$$\text{Payback period} = \frac{\text{Investment (Cost of project)}}{\text{Annual cash inflows}}$$

$$= \frac{4,00,000}{50,000} = 8 \text{ years}$$

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In the above example, cash inflows were evenly distributed over time. However, with non-uniform cash inflows, the computation of the payback period is somewhat different though the concept is the same. The example given below will clear the concept and calculation of payback period when the cash inflows are unevenly distributed over time.

***Example*:** Suppose a firm has two projects to be considered by it. Each involves an initial investment of ₹ 40,000. The annual cash inflow expected from investment *Y* and *Z* are shown in Table 13.1

Table 13.1

Years	*Net Cash Flows from Investment*	
	Y (₹)	*Z* (₹)
1	4,000	20,000
2	6,000	18,000
3	10,000	12,000
4	12,000	10,000
5	12,000	8,000
6	15,000	6,000
7	20,000	5,000

Table 13.1 reveals that project *Y* gives a return of ₹ 32,000 in the first four years which is ₹ 8,000 short of the original investment. From the cash inflows of the fifth year, only ₹ 8,000 are needed to recover the investment. Therefore, ₹ 32,000 from the first four years plus 8,000/12,000 from the fifth year is required. The payback period is 4 years and 8* months for the project *Y*. In the same way, the payback period for the project *Z* can be computed. In this project the first 2 years can yield net cash inflows of ₹ 38,000 which is deficit by ₹ 2,000 from the original investment. In the third year, out of cash inflows of ₹ 12,000, first ₹ 2,000 are required to recover initial investment. Therefore, ₹ 38,000 form the first two years plus 2,000/12,000 from the third year are required. Thus, the payback period is 2 years and 2** months for the project *Z*.

In the above-mentioned examples, the projects were without the salvage value and therefore, there was no scope for salvage value in the computation of payback period. However, if the project is with salvage value and the same is considered in the determination of payback period, the process is known as *bailout*. Bailout is a method of determining the length of time that will be required for cash inflows and salvage value of the project to recoup the funds invested in a proposed project. This concept is based on the logic

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* $\frac{12 \text{ months}}{\text{Cash inflows for the year}} \times \text{Amount required to balance deficit in initial investment}$

$\frac{12}{12,000} \times 8,000 = 8 \text{ months}$

** $\frac{12}{12,000} \times 2,000 = 2 \text{ months}$

that a proposed project has a salvage value at the expiry of the project and, therefore, a due consideration must be given to this value in the evaluation of capital projects. In fact, it is an extension of the payback method.

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The payback method suggests the ranking of projects according to the length of time they take to pay back their initial costs. In fact, the management decides beforehand the maximum payback period, *i.e.*, *'cut-off period'*, beyond which a project is rejected. *Cut-off period* denoted the risk tolerance level in the firm. A project with a short payback period involves less risk than the one with a longer payback. Therefore, management always prefers to accept projects with quick payback because the short payback period in relation to the economic life would also indicate high profitability of a project. However, it is not always true because sometimes projects with shorter payback periods may be less profitable as compared to longer payback projects.

Another glaring weakness of the payback period as a device for evaluating investment is that it fails to consider whether the cash inflows are unevenly distributed over time. This method also does not take into account the time value of money. This lapse can be bridged by an improved method of payback technique—'*Discounted payback method*' which recognizes the time period required to equate cumulated present value of cash inflows with the present value of cash outflows in the evaluation of capital projects. It considers the amount of time required to convert the net present value of a project from negative to positive rather than the time required to recover the actual investment of the project. The period where the net present value of the project's cash flows amounts to zero is known as the *break-even period*. The period up to break-even period is the *'discounted payback period'*. The break-even period becomes the evaluation criterion for the selection of the projects. The projects with shorter discounted payback period are preferred.

Further, no consideration is given to cash inflows after the payback date under payback method. As a result, it hammers capital projects that yield small cash inflows in their early years and heavy cash inflows in their later years. However, to overcome this, drawback experts have developed a special device known as '*post payback profitability index*' which is a ratio between post payback profits and investment. The project with higher ratio is considered commercially more viable. Another limitation of the payback period method is to decide about cut-off period. Most of these criticism stem from the emphasis that the payback method places on liquidity rather than profitability; this character is its primary weakness (Rosell and Frasure, 1980).

Nevertheless, the utter simplicity of the payback period method makes it attractive to many persons, particularly non-financial people.

Payback Reciprocal: This method attempts to estimate the internal rate of return. The payback reciprocals are calculated by dividing annual cash inflow

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by the amount of investment. This method is considered suitable only if the life of the project is at least twice the payback period. To be more accurate, the payback reciprocal should be used only for such projects that generate uniform cash inflows. This is because non-uniform cash flows may cause the payback reciprocal to be a very poor estimate of the internal rate of return which is used as measuring yard for the evaluation of the project under this method.

13.3.2 Accounting Rate of Return

Accounting rate of return method also known as the *financial statement method, the book value method, the unadjusted rate of return method* is consistent with the accounting measurements of income by using accounting records. It is based on the traditional concepts of accounting income and return on investment. Under this method, the evaluation of the project is done on the basis of rate of return. The rate of return on investment may be computed by several different methods yielding somewhat different results. The most common among them are:

- *Average rate of return on original investment:* This method is perhaps the simplest and most common method used by small firms. In this method, the average rate of return is simply calculated by dividing average earnings after depreciation and tax from the investment by total investment.

$$\text{Average rate of return (ARR)} = \frac{\text{Average annual earnings}}{\text{Total investment}} \times 100$$

Illustration 13.1: A project which costs ₹ 1,20,000 is expected to yield total earnings after depreciation and tax of ₹ 60,000 over 3 years. The scrap value of the project after 3 years has been calculated as ₹ 20,000. Calculate the average rate of return on the investment.

Solution

Average earning (after depreciation and tax) = $\frac{60,000}{3}$

= ₹ 20,000

Total investment in the project = ₹ 1,20,000 – 20,000 (Scrap value)

= ₹ 1,00,000

$$\text{Average rate of return} = \frac{\text{Average annual earnings}}{\text{Total investment}} \times 100$$

$$= \frac{20,000}{1,00,000} \times 100$$

$$= 20\%$$

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- *Average rate of return on average investment:* In this method, instead of original investment, average investment is used for determining rate of return on investment. The philosophy for the use of average investment is that as time passes and assets depreciate, the book value of the projects declines. Therefore, the amount of investment for determining rate of return should be average investment which is obtained by adding the beginning and ending value and diving the same by two. Thus,

$$\text{Average rate of return} = \frac{\text{Average annual earnings}}{\text{Total investment}} \times 100$$

Illustration 13.2: Calculate average rate of return on average investment by using the data given in Illustration 13.1:

$$\text{Average rate of return} = \frac{20,000}{70,000} \times 100$$

= 29% App.

Working:

Calculation of average investment:

$$= \frac{\text{Original investment + Scrap value}}{2}$$

$$= \frac{1,20,000 + 20,000}{2}$$

$$= \frac{1,40,000}{2} = ₹\ 70,000$$

The results of the above two illustrations, clearly reveal that there is significant variation in the accounting rate of return with the change in the investment base. However, this does not mean that one method is superior to the other. Each investment base is suitable for a particular business decision. Therefore, management should use the investment base which it finds most appropriate for the purpose. Firms prefer to use rate of return method for evaluating capital projects as they find required data readily available from financial statements for evaluation. Further, this technique considers entire earnings of a project rather than earning up to the payback period. At the same time, the accounting rate of return is easy to operate and simple to understand because executives find it closely parallel to the traditional concepts of income analysis and investment return. However, the accounting rate of return method is weak in that it fails to consider the time value of money by treating each future rupee of income as equivalent to the rupee invested or earned presently. Another weakness of this method is that no consideration is given to cash inflows that may be associated with a project.

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Check Your Progress

1. What is bailout?
2. Why should payback reciprocal method be used only for projects generating uniform cash inflows?
3. State the philosophy behind the average rate of return on average investment.

13.4 DISCOUNTED CASH FLOW (TIME-ADJUSTED) METHOD

The discounted cash flows method deals with actual cash flow instead of the accounting concept of income. It recognizes the time value of money and claims that a rupee in hand today possesses more worth than a rupee to be received in future. The amount of money to be received in the future is not equivalent to the same amount of money held at the present time because of the difference in time. The difference in the value of two amounts of the two different periods represents the interests, which is the cost of money to the borrower and a return to the lender. On this plea the discounted cash flow method discounts money due in the future to compensate for the interest it could earn if it were available today instead. The discounted value is called the present worth. This concept is obviously significant for evaluation of capital project by ensuring that the amount of investment is not more than the present value of the future cash receipts. This is done by discounting future cash receipts to present value.

The discounted cash flow model is based on the following assumption:

- The cash inflows from a project occur at the end of each period;
- The cost of capital—cost of funds obtained from investors—is determinable; and
- The rate of interest used is relevant for the life of the project. This would also mean that the cash inflows can be reinvested at the discounting rate.

The major techniques of discounted cash flow method have been discussed below:

13.4.1 The Net Present Value Method

The net present value method attempts to discount the cash flows of a project to their present value using a pre-determined discount rate representing the cost of capital***. This method aims to find the net present value of the project

*** The cost of capital is a technical term used by writers on business finance to refer to the rate which a firm must earn on its investments

which represents the difference between the present value of cash inflows and the present value of cash outflows. If the present value of the cash inflows exceeds the present value of cash outflows the result is termed positive which indicates that the project earns more than the minimum acceptable rate of interest. The result is negative if the present value of cash outflows is greater than the present value of cash inflows because it would mean that the rate of return is less than the minimum acceptable rate. The net present value method involves the following steps:

(i) Estimation of project's cash inflows and outflows over the entire economic life of the project;

(ii) Discounting the cash flows to the present value by using the firm's cost of capital;

(iii) Calculating the net present value of the project by deducting the present value of cash outflows from the present value of cash inflows; and

(iv) The proposed project is accepted if the net present value of the project is positive and, otherwise, rejected. However, the mutually exclusive projects with positive net present value should be ranked in order of net present values—the higher the net present value, the higher the ranking.

The present value of a future amount of money can be computed by multiplying the future amount by the present value of ₹ 1. The present value of ₹ 1 can be computed with the use of following mathematical formula:

$$\text{Present value of ₹ } 1 = \frac{1}{(1+r)^n}$$

where r = interest rate or discount rate

n = number of years

Assume, for example, that ₹ 120 is to be received two years later with compound interest at 20 per cent.

The present value of ₹ 120 will be:

Present value of ₹ 1 at the end of 2nd year at 20 per cent discount rate:

$$= \frac{1}{(1+20/100)^2}$$

$$= \frac{1}{(1.20)^2}$$

$$= \frac{1}{1.44}$$

= ₹ 0.6944

Present value of ₹ 120 at the end of 2nd year at 20 per cent discount rate

= ₹ 0.6944 × ₹ 120

= ₹ 83.333

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Thus, the present value of ₹ 120 at the expiry of two years at an interest rate of 20 per cent will be ₹ 83.333. In other words it means we have to invest ₹ 83.333 in order to receive ₹ 120 after 2 years at a interest rate of 20 per cent.

Often business executives have to compute the present value of a series of cash inflows to be received at periodic intervals in the future. For example ₹ 5,000 is to be received at the end of each year of six years with a compound interest of 10 per cent. Under such a situation the present value of six annual return is to be computed as shown below:

End of Year	*Present Value of Annual Returns*	$\left[\frac{1}{(1+r)^n} F^*\right]$
1	$\frac{1}{(1+10/100)^1} \times 5,000$	= ₹ 4,545
2	$\frac{1}{(1.10)^2} \times 5,000$	= ₹ 4,132
3	$\frac{1}{(1.10)^3} \times 5,000$	= ₹ 3,756
4	$\frac{1}{(1.10)^4} \times 5,000$	= ₹ 3,415
5	$\frac{1}{(1.10)^5} \times 5,000$	= ₹ 3,105
6	$\frac{1}{(1.10)^6} \times 5,000$	= ₹ 2,822
Present value of ₹ 5,000 received at the end of each year for 6 years (Total ₹ 30,000)		= ₹ 21,775

On the basis of above working, the following equation can be developed to compute the present value for all the cash inflows generated out of an investment:

$$PV = \frac{F1}{(1+r)^1} + \frac{F2}{(1+r)^2} + \frac{F3}{(1+r)^3} + ... \frac{Fn}{(1+r)^n}$$

where PV = Present value

F1, F2 and so on = Future cash inflow

r = Rate of interest

n = Expected life of the project.

Thus, the present value of annual returns in case of above example can also be computed as under:

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$$PV = \frac{F1}{(1+r)^1} + \frac{F2}{(1+r)^2} + \frac{F3}{(1+r)^3} + \ldots \frac{Fn}{(1+r)^n}$$

$$= \left[\frac{5,000}{\left[1+\frac{10}{100}\right]^1} + \frac{5,000}{\left[1+\frac{10}{100}\right]^2} + \frac{5,000}{\left[1+\frac{10}{100}\right]^3} + \frac{5,000}{\left[1+\frac{10}{100}\right]^4} + \frac{5,000}{\left[1+\frac{10}{100}\right]^5} + \frac{5,000}{\left[1+\frac{10}{100}\right]^6}\right]$$

$$= \left[\frac{5,000}{1.10} + \frac{5,000}{1.21} + \frac{5,000}{1.331} + \frac{5,000}{1.4641} + \frac{5,000}{1.61051} + \frac{5,000}{1.771561}\right]$$

= (4,545 + 4,132 + 3,756 + 3,415 + 3,105 + 2,822)

= ₹ 21,775.

On the same basis the net present value can be computed with the use of the following formula:

$$NPV = \frac{F1}{(1+r)^1} + \frac{F2}{(1+r)^2} + \frac{F3}{(1+r)^3} + \ldots \frac{Fn}{(1+r)^n} - I$$

where

NPV = Net present value

F1, F2...... = Future cash inflow

r = Rate of interest

n = Expected life of the project

I = Initial cost of the investment

The above-given mathematical formula can only be applied to such decisions where all cash outflows of the project take place in the initial period. In case of the investment where cash outflows is spread over more than one year, the cash outflows are to be converted to present value along with cash inflows. Accordingly, net present value model for conventional investment* as given above is to be modified as shown below to have scope for non-conventional investment* decisions.

$$NPV = \frac{F0}{(1+r)^0} + \frac{F1}{(1+r)^1} + \frac{F2}{(1+r)^2} + \frac{F3}{(1+r)^3} + \ldots \frac{Fn}{(1+r)^n} - I_0 + \frac{I_1}{(1+r)^1} + \frac{I_2}{(1+r)^2} + \frac{I_3}{(1+r)^3} + \ldots \frac{I_n}{(1+r)^n}$$

where

I_0, I_1, I_2 and so on = Cash outflows from zero period to nth period.

The present values of the cash flows can also be obtained more simply by consulting present value tables that show the present worth of a future rupee for given time periods and specified interest rate.

Illustration 13.3 Super Ess Ltd., is considering two mutually exclusive projects with an investment of ₹ 40,000 each. The details about the projects are given below:

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Years	Earnings before Depreciation after Taxation (Cash Flows)	
	Project EMM (₹)	Project BEE (₹)
1	4,000	20,000
2	5,000	18,000
3	8,000	15,000
4	10,000	12,000
5	12,000	10,000
6	15,000	8,000
7	20,000	5,000

Management has decided to earn 10 per cent return on its investments. You are required to calculate present value of the two projects and suggest which of the two projects you consider is financially preferable.

Solution

Statement Showing Net Present Value (NPV) of EMM and BEE Projects

Year	Project EMM			Project BEE		
	Cash Flows (₹)	PV of ₹ 1 (10%)	PV of Cash Flows (₹)	Cash Flows (₹)	PV of ₹ 1 (10%)	PV of Cash Flows (₹)
1	4,000	0.91	3,640	20,000	0.91	18,200
2	5,000	0.83	4,150	18,000	0.83	14,940
3	8,000	0.75	6,000	15,000	0.75	11,250
4	10,000	0.68	6,800	12,000	0.68	8,160
5	12,000	0.62	7,440	10,000	0.62	6,200
6	15,000	0.56	8,400	8,000	0.56	4,480
7	20,000	0.51	10,200	5,000	0.51	2,550
Present value of cash inflows			46,630			65,780
Less: Cost of project:			40,000			40,000
Net present value			6,630			25,780

Comment

Above statement shows that project BEE is with highest net present value of ₹ 25,780 and therefore, must be preferred over project EMM which has net present value of ₹ 6,630 only. It means that the value of the firm will increase by ₹ 25,780 if it invests in project BEE but by only ₹ 6,630 if it invests in project EMM.

Treatment of Project Salvage/Scrap Value in the Computation of NPV: Often capital projects when disposed of on their expiry realise some cash inflow in the shape of salvage value or scrap value. Such a value of the project is considered cash inflow for the project and is added with the cash inflows as generated by the project during its active life and, therefore, enters into

computation of net present value of the project. Thus, salvage value of the project becomes a part of the n^{th} year cash inflow. Even the estimated salvage value of the project enters in the computation of the net present value of the project.

NOTES

Illustration 13.4: National Company Ltd., is faced with the problem of choosing between two mutually exclusive projects with a cost of ₹ 45,000 each and requests you to advise them on the profitability of the projects. The cash inflows for the estimated life of the projects are expected to be as follows:

Years	*Cash Inflows*	
	Project-A (₹)	*Project-B* (₹)
1	4,000	12,000
2	12,000	16,000
3	16,000	20,000
4	24,000	12,000
5	16,000	8,000

The company's rate of return is 10 per cent. Both the projects have a five-year life. Project A has a scrap value of ₹ 8,000 and Project B has ₹ 5,000 scrap value.

Solution

Statement Showing Net Present Value (NPV) of A and B Projects

Year	*Project A*			*Project B*		
	Cash Flows (₹)	*PV of ₹ 1 (10%)*	*PV of Cash Flows* (₹)	*Cash Flows* (₹)	*PV of ₹ 1 (10%)*	*PV of Cash Flows* (₹)
1	4,000	0.91	3,640	12,000	0.91	10,920
2	12,000	0.83	9,960	16,000	0.83	13,280
3	16,000	0.75	12,000	20,000	0.75	15,000
4	24,000	0.68	16,320	12,000	0.68	8,160
5	24,000*	0.62	14,880	13,000*	0.62	8,060
Present value of cash inflows			56,800			55,420
Less: Cost of project			45,000			45,000
Net present value			11,800			10,420

Comment

According to the above analysis, the National Company Ltd., should invest in Project A. Although both projects exceed the minimum rate-of-return objective, but the net present value of ₹ 11,800 from the Project A is more than the net present value of ₹ 10,420 from the Project B. Therefore, the Project A promises slightly more than Project B in terms of addition to the value of the company.

NOTES

13.4.2 Internal Rate of Return (IRR) Method

The second discounted cash flow technique of investment appraisal is the Internal Rate of Return method. It is also known as the *discounted rate of return method, the adjusted rate of return method, investors method*, and *time-adjusted rate of return method*. This method attempts to determine the rate of interest which when applied to the future income stream will exactly equate the present value of that stream to the present value of the investment. Such a rate of interest is technically known as *Internal Rate of Return*. Thus, the internal rate of return is the discount rate that equated the present value of net benefits from the project with the cost of the project. In simple words, the internal rate of return is that discount rate which will cause the net present value of the project to be equal to zero. This rate is also known as the "break-even" rate. The formula for calculating the internal rate of return is:

$$NPV = \frac{F1}{(1+r)^1} + \frac{F2}{(1+r)^2} + \frac{F3}{(1+r)^3} + ... \frac{Fn}{(1+r)^n} - I = 0$$

where

F1, F2 and so on = Future cash inflow

r = Rate of interest

n = Expected life of the project

I = Initial cost of investment

Under this method, the value of 'r'— internal rate of return is unknown which is determined internally. It is with this philosophy that this technique is known as internal rate of return method.

When the internal rate of return for the project is determined, it is compared with the company's predetermined rate of return to measure the profitability of the project. The project that produces an internal rate of return greater than the company's predetermined rate of return (usually the cost of capital) is selected and is normally rejected in other cases. Where the method is used to choose between mutually exclusive projects, the project that produces the higher rate of return is selected.

The computation of the internal rate of return requires the same basic data which is used for the computation of net present value. There is no organised system for calculating the internal rate of return. It is found by trial and error. The present value of the cash flows from an investment must be computed at some arbitrarily selected interest rate. Where the present value of cash inflows so computed is equal to investment cost that rate is selected. Normally the rate of return ranges between 10 per cent to 15 per cent, therefore, 10 per cent is a good start point for most of the problems.

NOTES

Business experts have developed a systematic procedure for determining the internal rate of return wherein a factor technically known as "*factor of the time-adjusted rate of return*" is computed by dividing initial investment by annual cash flow *i.e.*,

$$\text{Present value factor} = \frac{\text{Initial investment}}{\text{Annual cash inflows}}$$

The factor so computed shows present value of ₹ 1 received annually over 'n' years and thus helps executives to determine the internal rate of return of the particular project from the present value annuity tables. The method can be well understood from the below-mentioned illustration.

Illustration 13.5: Super Group Company Ltd. is considering a project that costs ₹ 22,600 has a life of 10 years. The project is expected to yield an annual cash flow of ₹ 4,000. Calculate internal rate of return.

Solution

$$\text{Present value factor} = \frac{\text{Initial investment}}{\text{Annual cash inflows}}$$

$$= \frac{₹\ 22{,}600}{4{,}000}$$

$$= 5.65$$

The above analysis reveals that a factor of 5.65 will equate cash inflow series of ₹ 4,000 with an initial investment of ₹ 22,600. To find internal rate of return we will now consult present value annuity tables (see Appendix Table 13.1). We can easily find from App. Table 13.1 that at 12 per cent rate of return for a period of 10 years, the present value is 5.650 which is exactly the figure of the factor we have computed. Therefore, 12 per cent rate of return is the internal rate of return for the present problem.

The above-explained systematic procedure used for determining the internal rate of return is applicable only for such investment decision where annual cash flows from the investments are uniform over the entire life of the project. The investment projects with non-uniform annual cash flows are not within the scope of the 'present value factor' system and as such it is not possible to use annuity tables to find internal rate of return. Therefore, in such investments, the internal rate of return is determined by hit and trial.

Illustration 13.6: Ordinary Company Ltd. is considering purchase of modern plant. Two types of plants —TEE and SEE are available in the market costing ₹ 4,25,070 and ₹ 3,18,030 respectively. The plants are mutually exclusive. The profits before charging depreciation but after payment of income tax are as follows:

NOTES

Years	Cash Inflows	
	Plant TEE (₹)	Plant SEE (₹)
1	90,000	70,000
2	1,20,000	1,00,000
3	1,80,000	1,30,000
4	90,000	90,000
5	60,000	60,000

Calculate the internal rate of return and comment on the profitability of the project.

Solution

Statement Showing Internal Rate of Return for Plant—TEE

Year	Cash Flows (₹)	Trail I		Trail II		Trail III	
		Present Value Factor at 8%	PV of Cash Flows (₹)	Present Value Factor at 10%	PV of Cash Flows (₹)	Present Value Factor at 9%	PV of Cash Flows (₹)
1	90,000	0.926	83,340	0.909	81,810	0.917	82,530
2	1,20,000	0.857	1,02,840	0.826	99,120	0.841	1,00,920
3	1,80,000	0.794	1,42,920	0.751	1,35,180	0.772	1,38,960
4	90,000	0.735	66,150	0.683	61,470	0.708	63,720
5	60,000	0.681	40,860	0.621	37,260	0.649	38,940
Present Value of cash inflows			4,36,110		4,14,840		4,25,070
Less: Cost of plant			4,25,070		4,25,070		4,25,070
Net present value			11,040		(–) 10,230		0

Statement Showing Internal Rate of Return for Plant—SEE

Year	Cash Flows (₹)	Trail I		Trail II		Trail III	
		Present Value Factor at 11%	PV of Cash Flows (₹)	Present Value Factor at 12%	PV of Cash Flows (₹)	Present Value Factor at 13%	PV of Cash Flows (₹)
1	70,000	0.900	63,000	0.892	62,440	0.885	61,950
2	1,00,000	0.811	81,100	0.797	79,700	0.783	78,300
3	1,30,000	0.731	95,030	0.711	92,430	0.693	90,090
4	90,000	0.658	59,220	0.635	57,150	0.613	55,170
5	60,000	0.593	35,580	0.567	34,020	0.542	32,520
Present Value of cash inflows			3,33,930		3,25,740		3,18,030
Less: Cost of plant			3,18,030		3,18,030		3,18,030
Net present value			15,900		7,710		0

Comments

The above result clearly shows that project TEE has an internal rate of return at 9 per cent whereas the internal rate of return for project SEE is 13 per cent. Therefore, it will be profitable for the company to purchase plant SEE.

NOTES

Illustration 13.7: A company has to make a choice between two investments—Project A and B, the immediate capital outlays being ₹ 1,35,000 and ₹ 1,13,180 respectively. They have an estimated life of 5 years and 4 years respectively with no salvage value. The company's required rate of return is 10 per cent. The anticipated net cash inflows for the projects over the successive years are as follows:

Years	*Net Cash Inflows*	
	Project-A (₹)	*Project-B* (₹)
1	20,000	25,000
2	30,000	30,000
3	45,000	40,000
4	55,000	65,000
5	40,000	–

Calculate Internal Rate of Return of the projects. Which project would you recommend and why?

Solution

Statement Showing Internal Rate of Return of Project-A

Year	*Cash Flows* (₹)	*Trail I*		*Trail II*		*Trail III*	
		Present Value Factor at 10%	*PV of Cash Flows* (₹)	*Present Value Factor at 11%*	*PV of Cash Flows* (₹)	*Present Value Factor at 12%*	*PV of Cash Flows* (₹)
1	20,000	0.909	18,180	0.901	18,020	0.893	17,860
2	30,000	0.826	24,780	0.812	24,360	0.797	23,910
3	45,000	0.751	33,795	0.731	32,895	0.712	32,040
4	55,000	0.683	37,565	0.659	36,245	0.635	34,925
5	40,000	0.621	24,840	0.593	23,720	0.567	22,680
Present Value of cash inflows			1,39,160		1,35,240		1,31,415
Less: Cost of plant			1,35,000		1,35,000		1,35,000
Net present value			4,160		240		(–) 3,585

The analysis of the above statement reveals that at 10 per cent discounting rate the net present value of the project amounts to ₹ 4,160. In the second attempt a higher discounting rate *i.e.*, 11 per cent was used in order to reduce the amount of net present value which reached to a figure of ₹ 240. In the third attempt 12 per cent discounting rate was tested to equate the net benefits and cost of the project, it resulted in a negative net present value of ₹ 3,585. The comparative study of the result indicates that 11 per cent rate of return is the rate that approximately equates the present value of inflows

and outflows. To bring more accuracy in the results the statistical technique of interpolation can be used. Thus, internal rate of return is computated as 11.06 per cent*.

NOTES

Statement Showing Internal Rate of Return of Project-B

Year	*Cash Flows* (₹)	*Trail I*		*Trail II*		*Trail III*	
		Present Value Factor at 10%	*PV of Cash Flows* (₹)	*Present Value Factor at 12%*	*PV of Cash Flows* (₹)	*Present Value Factor at 13%*	*PV of Cash Flows* (₹)
1	25,000	0.909	22,725	0.893	22,325	0.885	22,125
2	30,000	0.826	24,780	0.797	23,910	0.783	23,490
3	40,000	0.751	30,040	0.712	28,480	0.693	27,720
4	65,000	0.683	44,395	0.635	41,275	0.613	39,845
Present Value of cash inflows			1,21,940		1,15,990		1,13,180
Less: Cost of plant			1,13,180		1,13,180		1,13,180
Net present value			8,760		2,810		–

The above computation indicates that at discount rate of 13 per cent, the present value of cash inflow is equal to the cost of project, therefore, this rate is the internal rate of return for Project B.

Both the projects satisfy the company's selection criteria *i.e.*, minimum rate of return of 10 per cent. However, Project B will be preferred over a Project A as its internal rate of return (13 per cent) is higher than the internal rate of return of Project A which is 11.06 per cent.

The NPV and IRR Methods Compared: Both methods make use of discounted cash flows and both consider amount and time of the cash flow arising from a project. Therefore, there is much similarity between these two techniques. But at the same time they differ with each other on certain grounds. The important among them are:

(i) Under net present value method discounting factor *i.e.*, interest rate of the cash flow is known whereas such rate is worked out in case of internal rate of return.

(ii) The market rate of interest is used as basis for determining cost of capital which is mostly discounting factor under net present value method. On the other hand, the discounting factor and the market rate of interest are not so closely associated.

(iii) A project may have more than one IRR which is not possible in case of NPV.

13.4.3 Profitability Index

Profitability index represents the ratio between present value of cash inflows and present value of cash outflows of a project. Thus,

$$\text{Profitability index} = \frac{\text{Present value of cash inflows}}{\text{Present value of cash outflows}}$$

This ratio provides a common measure for investments of different magnitude by expressing the present value of projects per rupee of investment. If the ratio is one or more than one the result is termed as positive and the project is considered desirable. The project is considered undesirable under a reverse result. The higher the profitability index, the more desirable the project. Thus, it also helps executives in the ranking of competing projects particularly when investment cost differs significantly.

Illustration 13.8: A project requires initial investment of ₹ 85,000 and is expected to give cash flow of ₹ 18,000, ₹ 25,000, ₹ 10,000, ₹ 25,000 and ₹ 30,000 for five years. The project has a salvage value of ₹ 10,000. The company's target rate of return is 10 per cent. Calculate the profitability of the project by using profitability index method.

Solution

Statement Showing Net Present Value

Year	*Cash Flows (₹)*	*Present Value Factor at 10%*	*Present Value of Cash Flows (₹)*
1	18,000	0.909	16,362
2	25,000	0.826	20,650
3	10,000	0.751	7,510
4	25,000	0.683	17,075
5	40,000	0.621	24,840
Present value of cash flows			86,437

Note: Cash flow of the last year includes salvage value of ₹ 10,000.

$$\text{Profitability index} = \frac{\text{Present value of cash inflows}}{\text{Present value of cash outflows}}$$

$$= \frac{86,437}{85,000}$$

$$= 1.016$$

The profitability index is 1.016 which means net present value is positive. Therefore, project is desirable.

13.5 PRACTICAL PROBLEMS

NOTES

Problem 13.1: Super State Company is evaluating two capital projects whose estimated cash savings are as follows:

Year	*Cash In-flows*	
	Project-X (₹)	*Project-Y* (₹)
1	7,000	10,000
2	9,000	5,000
3	12,000	7,000
4	12,000	12,000
5	20,000	15,000

Project X costs ₹ 50,000 and Project Y costs ₹ 30,000. Neither project has any Salvage value at the end of its useful life. Compute the payable period on each project and discuss which project is preferable.

Solution

Computation of payback period:

Project X:

Cash inflow for first 4 years = ₹ 40,000

5th year (Balance) = ₹ 10,000

= ₹ 50,000

Therefore, Payback period = 4 years and 6 months*

* 12/20,000 × 10,000 = 6 months.

Project Y:

Cash inflow for first 3 years = ₹ 22,000

4th year (Balance) = ₹ 8,000

= ₹ 30,000

Therefore, payback period = 3 years and 8 months**

** 12/12,000 × 8,000 = 8 months

Comment

The Project Y is more profitable as compared to Project X as it involves a payback period of only 3 years and 8 months which in Project X is 4 years and 6 months. Therefore, Project Y is preferable.

Problem 13.2: A company is evaluating a proposal to acquire a new plant for its production department. The cost of the plant is ₹ 4,50,000. The plant has a useful life of 10 years and is expected to yield an annual profit of ₹ 75,000 after depreciation but before tax. Depreciation and tax is charged at 10 per cent and 40 per cent respectively. Compute the payback period.

Solution

Calculation of annual cash flows:

	₹
Pre-tax profits	75,000
Less: Tax @ 40%	30,000
Post-tax profits	45,000
Add: Depreciation @ 10% on ₹ 4,50,000	45,000
Annual cash flow	90,000

$$\text{Payback period} = \frac{\text{Cost of plant}}{\text{Annual cash inflows}} = \frac{4,50,000}{90,000} = 5 \text{ years}$$

Problem 13.3: A firm is considering the acquisition of equipment costing ₹ 4,50,000. The equipment is expected to have a useful life of 5 years. Before considering the effect of depreciation the annual cash flow returns after income-tax from the use of this equipment are estimated at ₹ 1,60,000. The company has set a cut-off rate of 10 per cent. Calculate discounted payback period.

Solution

Calculation of Present Values of Cash Inflows

Year	*Cash Inflows* (₹)	*PV at 10% Discount Factor*	*Present Value* (₹)	*Cumulative Present Value* (₹)
1	1,60,000	0.909	1,45,440	1,45,440
2	1,60,000	0.826	1,32,160	2,77,600
3	1,60,000	0.751	1,20,160	3,97,760
4	1,60,000	0.683	1,09,280	5,07,040
5	1,60,000	0.621	99,360	6,06,400

From the above table, it is evident that the discounted payback period falls between 3rd and 4th year. Thus, exact discounted payback period will be:

NOTES

Cumulative discounted

Cash inflow for first 3 years = ₹ 3,97,760

4th year (Balance) = ₹ 52,240

= ₹ 4,50,000

Therefore, Discounted payback period = 3 years and 6 months*

* 12/1,09,280 × 52,240 = 6 months (app.)

Problem 13.4: An interesting project is being considered by M Ltd. The project will require an investment of ₹ 6,00,000 in equipment that is expected to have a useful life of 8 years with no salvage value. The total earning after depreciation before income-tax from this project during its life has been estimated ₹ 16,00,000. Income tax is estimated at 40 per cent of income before income-tax. A minimum rate-of-return objective has been established at 15 per cent. Comment on the profitability of the project by analysing company's average rate of return on investment.

Solution

Calculation of Total Earnings after Tax from the Project

Estimated earning before income tax = ₹ 16,00,000

Less: Income tax at 40% = ₹ 6,40,000

Earnings after tax = ₹ 9,60,000

$$\text{Average Earnings (after depreciation and tax)} = \frac{9,60,000}{8}$$

$$\text{Average rate of return} = \frac{\text{Average annual earnings}}{\text{Total investment}} \times 100$$

$$= \frac{1,20,000}{6,00,000} \times 100$$

$$= 20\%$$

Comment

The company is expected to earn an average rate of return of 20 per cent from the project while as the company's minimum rate-of-return is set at 15 per cent. Therefore, it will be profitable for the company to invest in this project.

Problem 13.5: The following data is available in respect of two mutually exclusive projects to be considered by the management for investment.

Year	Cash Inflow before Depreciation	
	Project-X (₹)	Project-Y (₹)
1	60,000	90,000
2	75,000	1,50,000
3	1,20,000	1,75,000
4	1,80,000	1,25,000
5	2,50,000	50,000

NOTES

Project X costs ₹ 275,000 and Project Y costs ₹ 3,00,000. An investment of this type is expected to earn a discounted rate of return at least 12 per cent. You are required to determine the more desirable project by the net present value method.

Solution

Statement Showing Net Present Value (NPV) of X and Y Projects

Year	Project X			Project Y		
	Cash Flows (₹)	PV of ₹ 1 (12%)	PV of Cash Flows (₹)	Cash Flows (₹)	PV of ₹ 1 (12%)	PV of Cash Flows (₹)
1	60,000	0.893	53,580	90,000	0.893	80,370
2	75,000	0.797	59,775	1,50,000	0.797	1,19,550
3	1,20,000	0.712	85,440	1,75,000	0.712	1,24,600
4	1,80,000	0.635	1,14,300	1,25,000	0.635	79,375
5	2,50,000	0.567	1,41,750	50,000	0.567	28,350
Present value of cash inflows			4,54,845			4,32,245
Less: Cost of project:			2,75,000			3,00,000
Net present value			1,79,845			1,32,245

The above statement shows that the Project A must be preferred over project B as the project A has the highest net present value as compared to Project B.

Problem 13.6: Beauty Company Ltd. is evaluating a proposal to acquire portable computer terminal for its sales division. The terminal simplify and speed up order processing and would produce cost savings of ₹ 40,000 per year. The computer has a eight year useful life with no salvage value. The cost of computer is ₹ 1,20,000 excluding installation charges of ₹ 30,000. Depreciation of ₹ 1,50,000 is to be deducted in each year of the next 8 years. The investment must meet a minimum rate of return requirement of 15 per cent. Income tax is estimated at 40 per cent of income before tax. You are required to advise the management on the purchase of the computer.

NOTES

Solution

Calculation of cash inflows

		₹
	Cost savings	40,000
Less:	Depreciation $\left[\frac{1,50,000}{8}\right]$	18,750
	Net savings before tax	21,250
Less:	Income Tax @ 40%	8,500
	Net savings after tax	12,750
Add:	Depreciation	18,750
	Annual cash inflow	31,500

Calculation of Net Present Value of Cash Inflows

Year	*Cash Inflow*	*PV of ₹ 1 (15%)*	*PV of Cash Flows (₹)*
1	31,500	0.869	27,373
2	31,500	0.756	23,814
3	31,500	0.657	20,696
4	31,500	0.571	17,986
5	31,500	0.497	15,656
6	31,500	0.432	13,608
7	31,500	0.376	11,844
8	31,500	0.326	10,269
			1,41,246

Since in this problem the annual cash inflows are evenly spread over the entire life of the project, therefore, the present value of the cash inflows can be computed as:

PV of ₹ 1 received annually for 8 years = 4.484

PV of ₹ 31,500 received annually for years = 31,500 × 4.484

PV of cash inflows = 1,41,246

Therefore, Net present value = (PV of cash inflow – PV of cash outflow)

= 1,41,246 – 1,50,000*

= (–) ₹ 8,754

*Calculation of cash outflows

Cost of Computer	= ₹ 1,20,000
Add: Installation charges	= ₹ 30,000
Cash inflows	= ₹ 1,50,000

Management should not accept this proposal because it results in negative net present value of ₹ 8,754.

NOTES

Problem 13.7: Consider the following investments with the indicated cash flows:

	Project X	*Project Y*
Cost	₹ 99,125	₹ 27,200
Working Life	5 years	4 years
Earnings after tax		
Year	(₹)	(₹)
1	50,000	10,000
2	40,000	10,000
3	20,000	10,000
4	10,000	5,000
5	10,000	–

Neither of the project will have any salvage value. The company's required rate of return is 10 per cent.

You are required to rank the projects in order of profitability according to:

(a) Net present value method

(b) Internal rate of return

(c) Profitability index.

Solution

Calculation of Net Present Value

PV of Year	*Cash ₹ 1 (10%)*	*Project X*		*Project Y*	
		PV of ₹ 1 (₹)	*Cash Flows (₹)*	*PV of ₹ 1 (₹)*	*Cash Flows (₹)*
1	0.909	50,000	45,450	10,000	9,090
2	0.826	40,000	33,040	10,000	8,260
3	0.751	20,000	15,020	10,000	7,510
4	0.683	10,000	6,830	5,000	3,415
5	0.620	10,000	6,200	–	–
Present value of cash inflows		1,06,540		28,275	
Less: Cost of project		99,215		27,200	
Net present value		7,325		1,075	

Calculation of Internal Rate of Return

Year	*Cash Flows (₹)*	*Trail I*		*Trail II*		*Trail III*	
		Discount Factor at 10%	*PV of Cash Flows (₹)*	*Discount Factor at 12%*	*PV of Cash Flows (₹)*	*Discount Factor at 14%*	*PV of Cash Flows (₹)*
Project X							
1	50,000	0.909	45,450	0.893	44,650	0.877	43,850
2	40,000	0.826	33,040	0.797	31,880	0.769	30,760
3	20,000	0.751	15,020	0.712	14,240	0.675	13,500

NOTES

4	10,000	0.683	6,830	0.635	6,360	0.592	5,920
5	10,000	0.620	6,200	0.567	5,670	0.519	5,190
Present value of cash inflows			1,06,540		1,02,800		99,220
Less: Cost of project			99,215		99,215		99,215
Net present value			7,325		3,585		5
Project Y							
1	10,000	0.909	9,090	0.893	8,930		
2	10,000	0.826	8,260	0.797	7,970		
3	10,000	0.751	7,510	0.712	7,120		
4	5,000	0.683	3,415	0.636	3,180		
Present value of cash inflows			28,275		27,200		
Less: Cost of plant			27,200		27,200		
Net present value			1,075		0		

Calculation of profitability index

$$\text{Profitability index} = \frac{\text{PV of cash inflows}}{\text{PV of cash outflows}}$$

$$\text{Project X} = \frac{1,06,540}{99,215} = 1.07:1$$

$$\text{Project Y} = \frac{28,275}{27,200} = 1.04:1$$

Ranking:

	Project X	Project Y
Net present value	I	II
Internal rate of return	I	II
Profitability	I	II

Problem 13.8: A company proposing to expand its production can go in either for an automatic machine costing ₹ 2,24,000 with an estimated life of 5½ years or an ordinary machine costing ₹ 60,000 having an estimated life of 8 years. The annual sales and costs are estimated as follows:

	Automatic Machine (₹)	*Ordinary Machine* (₹)
Sales	1,50,000	1,50,000
Costs: Material	50,000	50,000
Labour	12,000	60,000
Variable overheads	24,000	20,000

Compute the comparative profitability of the proposals under the "payback period" and Return on Investment methods. Explain the difference in the result obtained under the two methods.

(*ICWA Final*)

Solution

I. **Computation of Payback Period**

$$\text{Payback period} = \frac{\text{Cost of project}}{\text{Annual cash inflows}}$$

$$\text{Payback period for Automatic machine} = \frac{₹\ 2,24,000}{64,000\ *} = 3\frac{1}{2}\ \text{years}$$

$$\text{Payback period for ordinary machine} = \frac{₹\ 60,000}{₹\ 20,000\ *} = 3\ \text{years}$$

**Calculation of annual cash inflows*

(i) Automatic machine:

Sales		₹ 1,50,000
Less: Cost:		
Material	50,000	
Labour	12,000	
Variable overhead	24,000	₹ 86,000
Cash inflow		₹ 64,000

(ii) Ordinary machine:

Sales	₹ 1,50,000	
Less: Cost:		
Material	50,000	
Labour	60,000	
Variable overhead	20,000	₹ 1,30,000
Cash inflow		₹ 20,000

II. **Computation of Return on Investment**

$$\text{Average rate of return} = \frac{\text{Average annual earning}}{\text{Average investment}} \times 100$$

$$\text{ARR for Automatic machine} = \frac{₹\ 64,000}{₹\ 1,12,000\ **} \times 100 = 57.14\%$$

$$\text{ARR for ordinary machine} = \frac{₹\ 20,000}{₹\ 30,000\ **} \times 100 = 66.67\%$$

*** Calculation of average investment*

$$\text{Average investment} = \frac{\text{Ordinary investment} + \text{Scrap value}}{2}$$

NOTES

$$\text{Average investment for Automatic machine} = \frac{₹\ 2,24,000 + 0}{2}$$

$$= ₹\ 1,12,000$$

$$\text{Average investment for ordinary machine} = \frac{₹\ 60,000 + 0}{2}$$

$$= ₹\ 30,000$$

Comments

1. The payback period for automatic machine has been worked 3½ years and the same is 3 years for the ordinary machine. In addition, the productive life of automatic machine is 5½ years which in case of the ordinary machine is 8 years. The payback period approach clearly reveals that ordinary machine should be preferred over automatic machine.
2. The analysis of rate of return also reveals the same result that the ordinary machine is preferable to the automatic machine. The rate of return in case of former is 66.67 per cent and in case of latter it is 57.14 per cent only.

Problem 13.9: The Alpha Co. Ltd. is considering the purchase of a new machine. Two alternative machines (A and B) have been suggested, each costing ₹ 4,00,000. Earnings after taxation are expected to be as follows:

Year	*Cash Flows (₹)*	
	Machine A	*Machine B*
1	40,000	1,20,000
2	1,20,000	1,60,000
3	1,60,000	2,00,000
4	2,40,000	1,20,000
5	1,60,000	80,000

The company has a target of return on capital of 10 per cent and on this basis, you are required to compare the profitability of the machines and state which alternative you consider financially preferable.

Note: The present value of ₹ 1 at 10 per cent

due in one year = 0.91

due in two years = 0.83

due in three years = 0.75

due in four years = 0.68

due in five years = 0.62 *(CA Final)*

NOTES

Solution:

Statement Showing Net Present Value (NPV) of Machines A and B.

Year	*PV Factor at 10%*	*Machine A*		*Machine B*	
		Cash Flows (₹)	*PV of Cash Flows (₹)*	*Cash Flows (₹)*	*PV of Cash Flows (₹)*
1	0.91	40,000	36,400	1,20,000	1,09,200
2	0.83	1,20,000	99,600	1,60,000	1,32,800
3	0.75	1,60,000	1,20,000	2,00,000	1,50,000
4	0.68	2,40,000	1,63,200	1,20,000	81,600
5	0.62	1,60,000	99,200	80,000	49,600
Present value of cash inflow			5,18,400		5,23,200
Less: Cost of Machine			4,00,000		4,00,000
Net present value			1,18,400		1,23,200

$$\text{Profitability index} = \frac{\text{PV of cash inflows}}{\text{PV of cash outflows}}$$

$$\text{Profitability index for machine A} = \frac{5,18,400}{4,00,000} = 1.296$$

$$\text{Profitability index for machine B} = \frac{5,23,200}{4,00,000} = 1.308$$

Comment

The net present value approach indicates that machine B is more profitable than machine A as its net present value is higher. This result is further supplemented by profitability index.

Check Your Progress

4. What is the meaning of positive and negative present value?
5. Mention some of the other names for internal rate of return method.
6. In which method of capital expenditure evaluation is the discounting factor already known: net present value or internal rate of return?
7. What does the profitability ratio of one or more than one mean for a project?

13.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

NOTES

1. Bailout is the method of determining the length of time that will be required for cash inflows and salvage value of the project to recoup the funds invested in a proposed project.
2. The payback reciprocal should be used only for such projects that generate uniform cash inflows. This is because non-uniform cash flows may cause the payback reciprocal to be a very poor estimate of the internal rate of return which is used as a measuring yard for the evaluation of the project under this method.
3. The philosophy for the use of average investment is that as time passes and assets depreciate, the book value of the project declines. Therefore, the amount of investment for determining rate of return should be average investment which is obtained by adding the beginning and ending value and diving the same by two.
4. If the present value of the cash inflows exceeds the present value of cash outflows the result is termed positive which indicates that the project earns more than the minimum acceptable rate of interest. The result is negative if the present value of cash outflows is greater than the present value of cash inflows because it would mean that the rate of return is less than the minimum acceptable rate.
5. The internal rate of return method is also known as the discounted rate of return method, the adjusted rate of return method, investors method, and time-adjusted rate of return method.
6. Under the net present value method discounting factor, i.e., interest rate of the cash flow is known whereas such rate is worked out in case of internal rate of return.
7. If the ratio is one or more than one the result is termed as positive and the project is considered desirable.

13.7 SUMMARY

- Capital budgeting is a process of long range planning for acquiring such assets which will render some sort of service over several accounting periods.
- Payback method involves the calculation of the span of time required to recover initial cash investment.
- Post payback profitability index which is a ratio between post payback profits and investment.

NOTES

- Payback reciprocal is a method of capital proposals that attempts to estimate the internal rate of return.
- Accounting rate of return method attempts to evaluate the project done on the basis of rate of return.
- Average rate of return on original investment considers average rate of return which is simply calculated by dividing the average earnings after depreciation and tax from the investment by the total investment.
- In average rate of return on average investment instead of original investment average investment is used for determining rate of return on investment.
- The discounted cash flows method deals with actual cash flow instead of the accounting concept of income.
- The net present value method attempts to discount the cash flows of a project to their present value using a pre-determined discount rate representing the cost of capital.
- Internal rate of return method attempts to determine the rate of interest which when applied to the future income stream will exactly equate the present value of that stream to the present value of the investment.
- Profitability index represents the ratio between present value of cash inflows and present value of cash outflows of a project.
- Capital rationing may be defined as a process which involves necessary ranking of investment proposals for a firm with shortage of capital to invest.

13.8 KEY WORDS

- **Payback period:** It is the length of time that elapses before cumulative cash inflows from the project equal the initial cash outlays for the project.
- **Discounted cash flow methods:** It deals with actual cash flow and recognizes time value of money.
- **Time value of money:** It is the concept which says that a rupee in hand today possesses more worth than a rupee to be received in future.
- **Internal rate of return:** It is the rate of interest which when applied to the future income stream will exactly equate the present value of that stream to the present value of the investment.
- **Profitability index:** It represents the ratio between present value of cash inflows and present value of cash outflows of a project.

13.9 SELF ASSESMENT QUESTIONS AND EXERCISES

NOTES

Short-Answer Questions

1. Explain the concept of capital budgeting. Why are capital investment decisions so important?
2. Discuss the nature and elements of capital budgeting.
3. Explain various techniques of evaluating capital investment proposal, which technique is considered to be the best?
4. What are the principle methods employed for ascertaining the profitability of a capital expenditure project?
5. How are net present value calculations performed in actual business situations?
6. Explain the difference between the Discounted Rate of Return method and the Net Present Value method in the evaluation of investment alternatives.
7. Explain the major drawbacks of various capital budgeting techniques.
8. In replacement situation, how are the proceeds from the sale of old equipment used in computing the net investment?
9. The investment alternative yielding the highest discounted rate of return is the most acceptable. Will this always be true? Explain.
10. Write short notes on:
    (a) Bailout
    (b) Post-payback profitability index
    (c) Payback reciprocal.
11. Explain the Accounting Rate of Return and the Internal Rate of Return methods for evaluating capital proposals.
12. Explain in detail the major steps in capital budgeting.
13. “The discounted rate of return and the present value methods of appraising capital expenditures projects accomplish basically the same goal”. Explain how they do this.
14. How does a capital investment differ from other business investment?
15. “It is the capital expenditure decision that spells the difference between the business success and business failure”. Do you agree with the above statement?

16. If the payback method does not consider the time value of money, why would it ever be beneficial to use?
17. If all proposed capital expenditure projects possess some desirable characteristics, how can management decide on the ones to pursue?
18. What three factors are related in the evaluation of capital investment alternatives?
19. Write short notes on:

    (a) Profitability index (b) Economic life of a project.
20. In measuring the profitability of capital expenditure proposal, what are the two primary characteristics that distinguish one technique from another?
21. Double ESS BEE Company Ltd. is planning to acquire a mini computer which costs ₹1,25,000. The computer has a 10-year useful life and has a scrap value of ₹ 20,000.The company estimates annual profit (before tax and depreciation) of ₹ 40,000 from the computer. The tax rate is 40 per cent.Compute the payback period.

Long-Answer Questions

1. Beauty Company Ltd. is considering two mutually exclusive projects—*X* and *Y*. The particulars are as under:

Particulars		***Project X (₹)***	***Project Y (₹)***
Initial investment		75,000	1,25,000
Estimated cash flows: (before tax)			
Year	1	20,000	10,000
	2	30,000	25,000
	3	25,000	40,000
	4	20,000	65,000
	5	10,000	90,000
	6	15,000	–

The average rate of tax may be taken at 40 per cent. Neither project has any scrap value. Compute the payback period on each project and discuss which project is preferable.

2. Marshall Industries Ltd. is planning to acquire a new machine which would carry out some operations at present performed by manual labour. The two alternative models under consideration are "EMM" and "ESS". Prepare a statement of profitability showing the payback period from the following information:

NOTES

Particulars	Model EMM	Model ESS
Cost of machine	₹ 4,50,000	₹ 2,50,000
Estimated life	10 years	12 years
Estimated saving in scrap per annum	₹ 35,000	₹ 20,000
Additional cost of supervision per annum	₹ 12,000	₹ 7,000
Additional cost of maintenance per annum	₹ 10,000	₹ 8,000
Estimated savings in direct wages	₹ 14,000	₹ 10,000
The rate of taxation may be regarded as 20 per cent of profit.		

3. A company is considering the purchase of two machines with the following details:

		Machine X (₹)	Machine Y (₹)
Cost of machine		₹ 50,000	₹ 75,000
Working life		5 years	4 years
Initial investment		75,000	1,25,000
Earning after tax			
Year	1	15,000	25,000
	2	20,000	30,000
	3	20,000	40,000
	4	10,000	20,000
	5	10,000	–

You are required to rank these alternative proposals based upon:

(a) Average rate of return (b) Net present value (discount rate—10% p.a.)

Briefly explain the reason for any difference in the rankings.

4. What are the Internal Rate of Return and Net Present Value for the following projects?

Year	Project X (₹)	Project Y (₹)
0	– 24,000	– 55,000
1	+ 6,000	+ 20,000
2	+ 14,000	+ 28,000
3	+ 20,000	+ 40,000

The cost of capital is 12 per cent, which project do you select on the basis of each criterion?

5. The Excellent Co. Ltd. has to select one of the two projects whose cost and cash inflows are:

NOTES

		Project X (₹)	Project Y (₹)
Cost		15,000	18,000
Cash inflow (after tax)			
Year	1	5,000	10,000
	2	7,000	5,000
	3	5,000	4,000
	4	4,000	3,000
	5	3,000	3,000

The cost of capital is 8 per cent. You are required to rank the projects under profitability index and give your comments.

6. A company has to make a choice between three possible projects, *X*, *Y* and *Z*, each requiring an initial investment of ₹ 18,000. Each will continue for 5 years and it has been decided that a discount rate of 10 per cent is acceptable for all three. The cash flows for these projects are:

Year	A (₹)	B (₹)	C (₹)
1	3,000	3,000	5,000
2	4,000	4,000	3,000
3	5,000	5,000	2,000
4	5,000	3,000	3,000
5	6,000	5,000	5,000

Which project would you recommend and why?

13.10 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.

NOTES

Table 13.1 *Present Value of Annuity of ₹ 1*

n	*.5%*	*1%*	*1.5%*	*2%*	*2.5%*	*3%*	*3.5%*	*4%*	*4.5%*	*n*
1	0.99502	0.99010	0.98522	0.98039	0.97561	0.97087	0.96618	0.96154	0.95694	1
2	1.98510	1.97040	1.95588	1.94156	1.92742	1.91347	1.89969	1.88609	1.87267	2
3	2.97025	2.94099	2.91220	2.88388	2.85602	2.82861	2.80164	2.77509	2.74896	3
4	3.95050	3.90197	3.85438	3.80773	3.76197	3.71710	3.67308	3.62990	3.58753	4
5	4.92587	4.85343	4.78264	4.71346	4.64583	4.57971	4.51505	4.45182	4.38998	5
6	5.89638	5.79548	5.69719	5.60143	5.50813	5.41719	5.32855	5.24214	5.15787	6
7	6.86207	6.72819	6.59821	6.47199	6.34939	6.23028	6.11454	6.00205	5.89270	7
8	7.82296	7.65168	7.48593	7.32548	7.17014	7.01969	6.87396	6.73274	6.59589	8
9	8.77906	8.56602	8.36052	8.16224	7.97087	7.78611	7.60769	7.43533	7.26879	9
10	9.73041	9.47130	9.22218	8.98259	8.75206	8.53020	8.31661	8.11090	7.91272	10
11	10.67703	10.36763	10.07112	9.78685	9.51421	9.25262	9.00155	8.76048	8.52892	11
12	11.61893	11.25508	10.90751	10.57534	10.25776	9.95400	9.66333	9.38507	9.11858	12
13	12.55615	12.13374	11.73153	11.34837	10.98318	10.63496	10.30274	9.98565	9.68285	13
14	13.48871	13.00370	12.54338	12.10625	11.69091	11.29607	10.92052	10.56312	10.22283	14
15	14.41662	13.86505	13.34323	12.84926	12.38138	11.93794	11.51741	11.11839	10.73955	15
16	15.33993	14.71787	14.13126	13.57771	13.05500	12.56110	12.09412	11.65230	11.23402	16
17	16.25863	15.56225	14.90765	14.29187	13.71220	13.16612	12.65132	12.16567	11.70719	17
18	17.17277	16.39827	15.67256	14.99203	14.35336	13.75351	13.18968	12.65930	12.15999	18
19	18.08236	17.22601	16.42617	15.67846	14.97889	14.32380	13.70894	13.13394	12.59329	19
20	18.98742	18.04555	17.16864	16.35143	15.58916	14.87747	14.21240	13.59033	13.00794	20
21	19.88798	18.85698	17.90014	17.01121	16.18455	15.41502	14.69797	14.02916	13.40472	21
22	20.78406	19.66038	18.62082	17.65805	16.76441	15.93692	15.16712	14.45112	13.78442	22
23	21.67568	20.45582	19.33086	18.29220	17.33211	16.44361	15.62041	14.85684	14.14777	23
24	22.56287	21.24339	20.03041	18.91393	17.88499	16.93554	16.05837	15.24646	14.49548	24
25	23.44564	22.02316	20.71961	19.52346	18.42438	17.41315	16.48151	15.62208	14.82821	25
26	24.32402	22.79520	21.39863	20.12104	18.95061	17.87684	16.89035	15.98277	15.14661	26
27	25.19803	23.55961	22.06762	20.70690	19.46401	18.32703	17.28536	16.32959	15.45130	27
28	26.06769	24.31644	22.72672	21.28127	19.96489	18.76411	17.66702	16.66306	15.74287	28
29	26.93302	25.06579	23.37602	21.84438	20.45355	19.18845	18.03577	16.98371	16.02189	29
30	27.79405	25.80771	24.01584	22.39646	20.93029	19.60044	18.39205	17.29203	16.28889	30
31	28.65080	26.54229	24.64615	22.93770	21.39541	20.00043	18.73628	17.58849	16.54439	31
32	29.50328	27.26959	25.26714	23.46833	21.84918	20.38877	19.06887	17.87355	16.78889	32
33	30.35153	27.98969	25.87895	23.98856	22.29188	20.76579	19.39021	18.14765	17.02286	33
34	31.19555	28.70267	26.48173	24.49859	22.72379	21.13184	19.70068	18.41120	17.24676	34
35	32.03537	29.40858	27.07559	24.99862	23.14516	21.48722	20.00066	18.66461	17.46101	35
36	32.87102	30.10751	27.66068	25.48884	23.55625	21.83225	20.29049	18.90828	17.66604	36
37	33.70250	30.79951	28.23713	25.96945	23.95732	22.16724	20.57053	19.14258	17.86224	37
38	34.52985	31.48466	28.80505	26.44064	24.34860	22.49246	20.84109	19.36786	18.04999	38

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39	35.35309	32.16303	29.36458	26.90259	24.73034	22.80822	21.10250	19.58448	18.22966	39
40	36.17223	32.83469	29.91585	27.35548	25.10278	23.11477	21.35507	19.79277	18.40158	40
41	36.98729	33.49969	30.45896	27.79949	25.46612	23.41240	21.59910	19.99305	18.56611	41
42	37.79830	34.15811	30.99405	28.23479	25.82061	23.70136	21.83488	20.18563	18.72355	42
43	38.60527	34.81001	31.52123	28.66156	26.16645	23.98190	22.06269	20.37079	18.87421	43
44	39.40823	35.45545	32.04062	29.07996	26.50385	24.25427	22.28279	20.54884	19.01838	44
45	40.20720	36.09451	32.55234	29.49019	26.83302	24.51871	22.49545	20.72004	19.15635	45
46	41.00219	36.72724	33.05649	29.89231	27.15417	24.77545	22.70092	20.88465	19.28837	46
47	41.79322	37.35370	33.55319	30.28658	27.46748	25.02471	22.89944	21.04294	19.41471	47
48	42.58032	37.97396	34.04255	30.67312	27.77315	25.26671	23.09124	21.19513	19.53561	48
49	43.36350	38.58808	34.52468	31.05208	28.07137	25.50166	23.27656	21.34147	19.65130	49
50	44.14279	39.19612	34.99969	31.42361	28.36231	25.72976	23.45562	21.48218	19.76201	50

Table 13.1 *Present Value of Annuity of ₹ 1 (continued)*

n	*5%*	*5.5%*	*6%*	*6.5%*	*7%*	*7.5%*	*8%*	*9%*	*10%*	*n*
1	0.95238	0.94787	0.94340	0.93897	0.93458	0.93023	0.92593	0.91743	0.90909	1
2	1.85941	1.84632	1.83339	1.82063	1.80802	1.79557	1.78326	1.75911	1.73554	2
3	2.72325	2.69793	2.67301	2.64848	2.62432	2.60053	2.57710	2.53129	2.48685	3
4	3.54595	3.50515	3.46511	3.42580	3.38721	3.34933	3.31213	3.23972	3.16987	4
5	4.32948	4.27028	4.21236	4.15568	4.10020	4.04588	3.99271	3.88965	3.79079	5
6	5.07569	4.99553	4.91732	4.84101	4.76654	4.69385	4.62288	4.48592	4.35526	6
7	5.78637	5.68297	5.58238	5.48452	5.38929	5.29660	5.20637	5.03295	4.86842	7
8	6.46321	6.33457	6.20979	6.08878	5.97130	5.85730	5.78664	5.53482	5.33493	8
9	7.10782	6.95220	6.80169	6.65610	6.51523	6.37889	6.24689	5.99525	5.75902	9
10	7.72173	7.53763	7.36009	7.1883	7.02358	6.86408	6.71008	6.41766	6.14457	10
11	8.30641	8.09254	7.88687	7.68904	7.49867	7.31542	7.13896	6.80519	6.49506	11
12	8.86325	8.61852	8.38384	8.15873	7.94269	7.73528	7.53608	7.16073	6.81369	12
13	9.39357	9.11708	8.85268	8.59974	8.35765	8.12584	7.90378	7.48690	7.10336	13
14	9.89864	9.58965	9.29498	9.01384	8.74547	8.48915	8.24424	7.78615	7.36669	14
15	10.37966	10.03758	9.71225	9.40267	9.10791	8.82712	8.55948	8.06069	7.60608	15
16	10.83777	10.46216	10.10590	9.76776	9.44665	9.14151	8.85137	8.31256	7.82371	16
17	11.27407	10.86461	10.47726	10.11058	9.76322	9.43396	9.12164	8.54363	8.02155	17
18	11.68959	11.24607	10.82760	10.43247	10.05909	9.70601	9.37189	8.75563	8.20141	18
19	12.08532	11.60765	11.15812	10.73471	10.33560	9.95908	9.60360	8.95011	8.36492	19
20	12.46221	11.95038	11.46992	11.01851	10.59401	10.19449	9.81815	9.12855	8.51356	20
21	12.82115	12.27524	11.76408	11.28498	10.83553	10.41348	10.01680	9.29224	8.64869	21
22	13.16300	12.58317	12.04158	11.53520	11.06124	10.61719	10.20074	9.44243	8.77154	22
23	13.48857	12.87504	12.30338	11.77014	11.27219	10.80669	10.37106	9.58021	8.88322	23
24	13.79864	13.15170	12.55036	11.99074	11.46933	10.98297	10.52876	9.70661	8.98474	24
25	14.09394	13.41393	12.78336	12.19788	11.65358	11.14695	10.67478	9.82258	9.07704	25

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26	14.37519	13.66250	13.00317	12.39237	11.82578	11.29948	10.80998	9.92897	9.16095	26
27	14.64303	13.89810	13.21053	12.57500	11.98671	11.44138	10.93516	10.02658	9.23722	27
28	14.89813	14.12142	13.40616	12.74648	12.13711	11.57338	11.05108	10.11613	9.30657	28
29	15.14107	14.33310	13.59072	12.90749	12.27767	11.69617	11.15841	10.19828	9.36961	29
30	15.37245	14.53375	13.76483	13.05868	12.40904	11.81039	11.25778	10.27365	9.42691	30
31	15.59281	14.72393	13.92909	13.20063	12.53181	11.91664	11.34980	10.34280	9.47901	31
32	15.80268	14.90420	14.08404	13.33393	12.64656	12.01548	11.43500	10.40624	9.52638	32
33	16.00255	15.07507	14.23023	13.45909	12.75379	12.10742	11.51389	10.46444	9.56943	33
34	16.19290	15.23703	14.36814	13.57661	12.85401	12.19295	11.58693	10.51784	9.60857	34
35	16.37419	15.39055	14.49825	13.68696	12.94767	12.27251	11.65457	10.56682	9.64416	35
36	16.54685	15.53607	14.62099	13.79057	13.03521	12.34652	11.71719	10.61176	9.67651	36
37	16.71129	15.67400	14.73678	13.88786	13.11702	12.41537	11.77518	10.65299	9.90592	37
38	16.86789	15.80474	14.84602	13.97921	13.19347	12.47941	11.82887	10.69082	9.73265	38
39	17.01704	15.92866	14.94907	14.06499	13.26493	12.53899	11.87858	10.72552	9.75696	39
40	17.15909	16.04612	15.04630	14.14553	13.33171	12.59441	11.92461	10.75736	9.77905	40
41	17.29437	16.15746	15.13802	14.22115	13.39412	12.64596	11.96723	10.78657	9.79914	41
42	17.42321	16.26300	15.22454	14.29216	13.45245	12.69392	12.00670	10.81337	9.81740	42
43	17.54591	16.36303	15.30617	14.35884	13.50696	12.73853	12.04324	10.83795	9.83400	43
44	17.66277	16.45785	15.38318	14.42144	13.55791	12.78003	12.07707	10.86051	9.84909	44
45	17.77407	16.54773	15.45583	14.48023	13.60552	12.81863	12.10840	10.88120	9.86281	45
46	17.88007	16.63292	15.72437	14.53543	13.65002	12.85454	12.13741	10.90018	9.87528	46
47	17.98102	16.71366	15.58903	14.58725	13.69161	12.88794	12.16427	10.91760	9.88662	47
48	18.07716	16.79020	15.65003	14.63592	13.73047	12.91902	12.18914	10.93358	9.89693	48
49	18.16872	16.86275	15.70757	14.68161	13.76680	12.94792	12.21216	10.94823	9.90630	49
50	18.25593	16.93152	15.76186	14.72452	13.80075	12.97481	12.23348	10.96168	9.91481	50

Table 13.1 *Present Value of Annuity of ₹ 1 (continued)*

n	*11%*	*12%*	*13%*	*14%*	*15%*	*16%*	*17%*	*18%*	*19%*	*n*
1	0.90090	0.82986	0.88496	0.87719	0.86957	0.86207	0.85470	0.84746	0.84034	1
2	1.71252	1.69005	1.68810	1.64666	1.62571	1.60523	1.58521	1.56564	1.54650	2
3	2.44371	2.40183	2.36115	2.32163	2.28323	2.24589	2.20958	2.17427	2.13992	3
4	3.10245	3.03735	2.97447	2.91371	2.85498	2.79818	2.74324	2.69006	2.63859	4
5	3.69590	3.60478	3.51723	3.43308	3.35216	3.27429	3.19935	3.12717	3.05763	5
6	4.23054	4.11141	3.99755	3.88867	3.78448	3.68474	3.58918	3.49760	3.40978	6
7	4.71220	4.56376	4.42261	4.28830	4.16042	4.03857	3.92238	3.81153	3.70570	7
8	5.14612	4.96764	4.79877	4.63886	4.48732	4.34359	4.20716	4.07757	3.95437	8
9	5.53705	5.32825	5.13166	4.94637	4.77158	4.60654	4.45057	4.30302	4.16333	9
10	5.88923	5.65022	5.42624	5.21612	5.01877	4.83323	4.65860	4.49409	4.33893	10
11	6.20652	5.93770	5.68694	5.45273	5.23371	5.02864	4.83641	4.65601	4.48650	11
12	6.49236	6.19437	5.91765	5.66029	5.42062	5.19711	4.98839	4.79322	4.61050	12

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13	6.74987	6.42355	6.12181	5.84236	5.58315	5.34233	5.11828	4.90951	4.71471	13
14	6.98187	6.62817	6.30249	6.00207	5.72448	5.46753	5.22930	5.00806	4.80228	14
15	7.19087	6.81086	6.46238	6.14217	5.84737	5.57546	5.32419	5.09158	4.87586	15
16	7.37916	6.97399	6.60388	6.26506	5.95423	5.66850	5.40529	5.16235	4.93770	16
17	7.54879	7.11963	6.72909	6.37286	6.04716	5.74870	5.47461	5.22233	4.98966	17
18	7.70162	7.24967	6.83991	6.46742	6.12797	5.81785	5.53385	5.27316	5.03333	18
19	7.83929	7.36578	6.93797	6.55037	6.19823	5.87746	5.58449	5.31624	5.07003	19
20	7.96333	7.46944	7.02475	6.62313	6.25933	5.92884	5.62777	5.35275	5.10086	20
21	8.07507	7.56200	7.10155	6.68696	6.31246	5.97314	5.66476	5.38368	5.12677	21
22	8.17574	7.64465	7.16951	6.74294	6.35866	6.01133	5.69637	5.40990	5.14855	22
23	8.26643	7.71843	7.22966	6.79206	6.39884	6.04425	5.72340	5.43212	5.16685	23
24	8.34814	7.78432	7.28288	6.83514	6.43377	6.07263	5.74649	5.45095	5.18223	24
25	8.42174	7.84314	7.32998	6.87293	6.46415	6.09709	5.76623	5.46691	5.19515	25
26	8.48806	7.89566	7.37167	6.90608	6.49056	6.11818	5.78311	5.48043	5.20601	26
27	8.54780	7.94255	7.40856	6.93515	6.51353	6.13636	5.97753	5.49189	5.21513	27
28	8.60162	7.98442	7.44120	6.96066	6.53351	6.15204	5.80985	5.50160	5.22280	28
29	8.65011	8.02181	7.47009	6.98304	6.55088	6.16555	5.82039	5.50983	5.22924	29
30	8.69379	8.05518	7.49565	7.00266	6.56598	6.17720	5.82939	5.51681	5.23466	30
31	8.73315	8.08499	7.51828	7.01988	6.57911	6.18724	5.83709	5.52272	5.23921	31
32	8.86860	8.11159	7.53830	7.03498	6.59053	6.16590	5.84366	5.52773	5.24303	32
33	8.80054	8.13535	7.55602	7.04823	6.60046	6.20336	5.84928	5.53197	5.24625	33
34	8.82932	8.15656	7.57170	7.05985	6.60910	6.20979	5.85409	5.53557	5.24895	34
35	8.85524	8.17550	7.58557	7.07005	5.61661	6.21534	5.85820	5.53862	5.25122	35
36	8.87859	8.19241	7.59785	7.07899	6.52314	6.22012	5.86171	5.54120	5.25312	36
37	8.89963	8.20751	7.60872	7.08683	6.62881	6.22424	5.86471	5.54339	5.25472	37
38	8.91859	8.22099	7.61833	7.09371	6.63375	6.22779	5.86727	5.54525	5.25607	38
39	8.93567	8.23303	7.62684	7.09975	6.63805	6.23086	5.86946	5.54682	5.25720	39
40	8.95105	8.24378	7.63438	7.10504	6.64178	6.23350	5.87133	5.54815	5.25815	40
41	8.96491	8.25337	7.64104	7.10969	6.64502	6.23577	5.87294	5.54928	5.25895	41
42	8.97740	8.26194	7.64694	7.11376	6.64785	6.23774	5.87430	5.55024	5.25962	42
43	8.98865	8.26959	7.65216	7.11733	6.65030	6.23943	5.87547	5.55105	5.26019	43
44	8.99878	8.27642	7.65678	7.12047	6.65244	6.24089	5.87647	5.55174	5.26066	44
45	9.00791	8.28252	7.66086	7.12322	6.65429	6.24214	5.87733	5.55232	5.26106	45
46	9.01614	8.28796	7.66448	7.12563	6.65591	6.24323	5.87806	5.55281	5.26140	46
47	9.02355	8.29282	7.66768	7.12774	6.65731	6.24416	5.87868	5.55323	5.26168	47
48	9.03022	8.29716	7.67052	7.12960	6.65853	6.24497	5.87922	5.55359	5.26191	48
49	9.03624	8.30104	7.67302	7.13123	6.35959	6.24566	5.87967	5.55389	5.26211	49
50	9.04165	8.30450	7.67524	7.13266	6.66051	6.24626	5.88006	5.55414	5.26228	50

NOTES

Table 13.1 *Present Value of Annuity of ₹ 1 (continued)*

n	*20%*	*21%*	*22%*	*23%*	*24%*	*25%*	*26%*	*28%*	*30%*	*n*
1	0.83333	0.82645	0.81967	0.81301	0.81645	0.80000	0.79365	0.78125	0.76923	1
2	1.52778	1.50946	1.49153	1.47399	1.45682	1.44000	1.42353	1.39160	1.36095	2
3	2.10648	2.07393	2.04224	2.01137	1.98130	1.95200	1.92344	1.86844	1.81611	3
4	2.58873	5.54044	2.49364	2.44827	2.40428	2.36160	2.32019	2.24097	2.16624	4
5	2.99061	2.92598	2.86364	2.80347	2.74538	2.68928	2.63597	2.53201	2.43557	5
6	3.32551	3.24462	3.16692	3.09225	3.02047	2.95142	2.88498	2.75938	2.64275	6
7	3.60459	3.50795	3.41551	3.32704	3.24232	3.16114	3.08331	2.93702	2.80211	7
8	3.83716	3.72558	3.61927	3.51792	3.42122	3.32891	3.24073	3.07579	2.92470	8
9	4.03097	3.90543	3.78628	3.67310	3.56550	3.46313	3.36566	3.18421	3.01900	9
10	4.19247	4.05408	3.92318	3.79937	3.68186	3.57050	3.46481	3.26892	3.09154	10
11	4.32706	4.17692	4.03540	3.90185	3.77569	3.65640	3.54350	3.33509	3.14734	11
12	4.43922	4.27845	4.12737	3.98524	3.85136	3.72512	3.60595	3.38679	3.19026	12
13	4.53268	4.36235	4.20277	4.05304	3.91239	3.78101	3.65552	3.42718	3.22328	13
14	4.61056	4.43170	4.26456	4.10816	3.63160	3.82408	3.69485	3.45873	3.24867	14
15	4.67547	4.48901	4.31522	4.15298	4.00129	3.85926	3.72607	3.48339	3.26821	15
16	4.72956	4.53637	4.35673	4.18941	4.03330	3.88741	3.75085	3.80265	3.28324	16
17	4.77463	4.57551	4.39077	4.21904	4.05911	3.90993	3.77052	3.51769	3.29480	17
18	4.81219	4.60786	4.41866	4.24312	4.07993	3.92794	3.78613	3.52645	3.30369	18
19	4.84350	4.63460	4.44152	4.26270	4.09672	3.94235	3.79851	3.53863	3.31053	19
20	4.86958	4.65669	4.46027	4.27862	4.11026	3.95388	3.80834	3.54580	3.31579	20
21	4.89132	4.67495	4.47563	4.29156	4.12117	3.96311	3.81615	3.55141	3.31984	21
22	4.90943	4.69004	4.48822	4.30208	4.12998	3.97049	3.82234	3.55579	3.32296	22
23	4.92453	4.70251	4.49854	4.31063	4.13708	3.97639	3.82725	3.55921	3.32535	23
24	4.93710	4.71282	4.50700	4.31759	4.14281	3.98111	3.83115	3.56188	3.32719	24
25	4.94759	4.72134	4.51393	4.32324	4.14742	3.98489	3.83425	3.56397	3.32861	25
26	4.95632	4.72838	4.51962	4.32784	4.15115	3.98791	3.83670	3.56560	3.32970	26
27	4.96360	4.73420	4.52428	4.33158	4.15415	3.99033	3.83865	3.56688	3.33054	27
28	4.96967	4.73901	4.52810	4.33462	4.15657	3.99226	3.84020	3.56787	3.33118	28
29	4.97472	4.74298	4.53123	4.33709	4.15853	3.99381	3.84143	3.56865	3.33168	29
30	4.97894	4.74627	4.53379	4.33909	4.16010	3.99505	3.84240	3.56926	3.33206	30
31	4.98245	4.74898	4.53590	4.34073	4.16137	3.99604	3.84318	3.56973	3.33235	31
32	4.98537	4.75122	4.53762	4.34206	4.16240	3.99683	3.84379	3.57010	3.33258	32
33	4.98781	4.75308	4.53903	4.34313	4.16322	3.99746	3.84428	3.57039	3.33275	33
34	4.98984	4.75461	4.54019	4.34401	4.16389	3.99797	3.84467	3.57062	3.33289	34
35	4.99154	4.75588	4.54114	4.34472	4.16443	3.99838	3.84497	3.57080	3.33299	35
36	4.99295	4.75692	4.54192	4.34530	4.16486	3.99870	3.84522	3.57094	3.33307	36
37	4.99412	4.75779	4.54256	4.34578	4.16521	3.99896	3.84541	3.57104	3.33313	37
38	4.99510	4.75950	4.54308	4.34616	4.16549	3.99917	3.84556	3.57113	3.33318	38
39	4.99592	4.75909	4.54351	4.34347	4.16572	3.99934	3.84569	3.57119	3.33321	39
40	4.99660	4.75958	4.54386	4.34672	4.16590	3.99947	3.84578	3.57124	3.33324	40
41	4.99717	4.75998	4.54415	4.34693	4.16605	3.99957	3.84586	3.57128	3.33326	41
42	4.99764	4.76032	4.54438	4.34710	4.16617	3.99966	3.84592	3.57132	3.33328	42
43	4.99803	4.76059	4.54458	4.34723	4.16627	3.99973	3.84597	3.57134	3.33329	43
44	4.99836	4.76082	4.54473	4.34734	4.16634	3.99978	3.84601	3.57136	3.33330	44
45	4.99863	4.76101	4.54486	4.34743	4.16641	3.99983	3.84604	3.57138	3.33331	45
46	4.99886	4.76116	4.54497	4.34751	4.16646	3.99986	3.84606	3.57139	3.33331	46
47	4.99905	4.76129	4.54506	4.34757	4.16650	3.99989	3.84608	3.57140	3.33332	47
48	4.99921	4.76140	4.54513	4.34762	4.16643	3.99991	3.84619	3.57140	3.33332	48
49	4.99934	4.76149	4.54519	4.34766	4.16656	3.99993	3.84611	3.57141	3.33332	49
50	4.99945	4.76156	4.54524	4.34769	4.16658	3.99994	3.84612	3.57141	3.33333	50

UNIT 14 METHODS OF EVALUATION OF ALTERNATIVE CAPITAL EXPENDITURE PROGRAMME

Structure

14.0 Introduction
14.1 Objectives
14.2 Economic Rate of Return (ERR): Economic Cost-Benefit Analysis
14.3 Social Rate of Return (SRR): Social Cost-Benefit Analysis
14.4 Capital Amortization Schedule (CAS)
14.5 Risk Adjusted Discount Rate (RADR)
- 14.5.1 Intuitive Approach
- 14.5.2 Constant Share Price Approach
- 14.5.3 CAPM Aapproach
- 14.5.4 Adjusted WACC approach

14.6 Answers to Check Your Progress Questions
14.7 Summary
14.8 Key Words
14.9 Self Assessment Questions and Exercises
14.10 Further Readings

14.0 INTRODUCTION

Various techniques for the evaluation of capital investment or capital expenditure proposals have been discussed in the previous unit. Academicians strongly advocate the discounted cash flow techniques for the capital budget evaluation. The DCF techniques are said to be in tune with the firm's objective of shareholder wealth maximization, because they consider the time value of money. While talking about the industry practices in the previous chapter, observations were made that more and more Indian firms are shifting towards the use of DCF techniques for the project evaluation. Almost three-fourth of the surveyed firms used DCF techniques. However, among them, the IRR was the most preferred technique compared to the NPV. Academicians advocate NPV rather than IRR, because in almost all situations, NPV serves better purpose.

The criteria of evaluation techniques discussed in the previous unit are used by the management for evaluating the financial viability of a project from the company's angle. The government and its agencies evaluate projects

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from the angle of national economy. Projects of social importance (undertaken by firms or government) need special attention in evaluation. Therefore, two more methods of project evaluation have come into the vogue namely:

(a) Economic Rate of Return (ERR): Economic Cost-Benefit Analysis

(b) The Social Rate of Return (SRR): Social Cost-Benefit Analysis

In this unit, you will learn about some other methods of evaluation of capital expenditure programme, such as the Economic Rate of Return (ERR) and Social Rate of Return (SSR), Capital Amortization Schedule (CAS) method and Risk Adjusted Discount Rate (RADR) method.

14.1 OBJECTIVES

After going through this unit, you will be able to:

- Discuss the economic rate of return for capital expenditure evaluation
- Describe the social rate of return
- Explain the Capital amortization schedule and risk adjusted discount rate

14.2 ECONOMIC RATE OF RETURN (ERR): ECONOMIC COST-BENEFIT ANALYSIS

A new project of a firm may have an impact on the economy in many ways. Revenue generation for government, conservation or earnings of valuable foreign exchange, creation of employment and distribution of income are most important among them, especially in underdeveloped and developing economies. A firm's cost and benefits from the project and internal rate of return (IRR) earned by the project for the firm is not an indicator of the net benefit to the nation's economy. Economic costs and benefits and economic rate of returns are calculated for determining the economic impact of a project.

Calculation of Economic Cost-Benefits

Costs and benefits of a project to the national economy are measured by making an adjustment in the financial cash flow of a project. The following two types of modifications are important:

(a) Firm's cash flow but not the cash flow for the economy (the cash flows that only change hands within a single economy is not the economic cash flow)

(b) Issues of immediate concerns for the nation.

The first point is often quantifiable with very little or no judgment. The second point has an element of subjective assessment. Both the points are conceptually explained below:

Cash flow that merely change hands

Some project cash flows occur for a firm but in the context of the national economy, it may not be a cash flow. These items are excluded from the calculation of economic cash flow. The following can be mentioned as examples where the firm's cash flow is not the cash flow for the economy:

(a) Subsidy received by the company on project investment

(b) Income tax and other direct and indirect tax expenses in the project report

Also, the use of resources that do not result into the depletion of national resources is not considered as economic cash flow though it may be a financial cash flow for the firm. Some examples are:

(c) Wages, only if in the situation of widespread unemployment, which is more common among unskilled labour in India. In this case, wages paid by the firm do not amount to the depletion of resources, because labour hour is a non-storable service which; otherwise, will remain idle and wasted. However, if the proposed project is just displacing the workers from the other gainful employment, it is surely the economic expense too.

It may be noted that financial (firm's) cash flow and economic (national) cash flow may not be the same because either it is merely a change of hands within the same economy or the firm is using idle resource which would have depleted anyway.

Issue of national concern

Nations may have several concerns. Some of them include conservation of some resources, impact on income distribution, social infrastructure (like education and research) and foreign exchange. A firm's financial cash flow would take actual value of the resources consumed and earned: for example, of foreign exchange. But, economic value of those cash flows may be different because these resources are dearer to the national economy. Therefore, the economic value of such financial cash flow must be adjusted either up or down, depending upon how much dear each one of them is.

Let us take an example of the foreign exchange component of a project. Foreign exchange is dear to many nations, especially to underdeveloped and developing nations because they usually experience the trade deficit or the balance of payment is unfavourable to them. Foreign exchange is a serious concern for such economies. Many corporate projects involve import of equipments and machinery, import and export of goods and services and in some cases, payment for dividends in foreign exchange. Some others reduce import as they produce import substitute items. The firm will take the actual

value of the foreign exchange and at the most, factor the foreign exchange risk in its translation into the home currency when it prepares the project report. But, for the nation, the 'value' of foreign exchange is higher because of its scarcity. Therefore, the value of net foreign exchange involved in a project will be given a higher value than its financial value. The economic value of foreign exchange is calculated using equation 14.1.

$$\text{Economic Cash Flow} = \text{Weight} \times \text{Conversion Ratio} \times \text{Net Foreign Exchange} \quad (14.1)$$

where,

(a) Weight is decided arbitrarily keeping in mind the seriousness of the foreign exchange reserves problem and

(b) Conversion ratio is calculated using equation 14.2.

$$\text{Conversion Ratio (CR)} = \frac{PV\ of\ Import}{PV\ of\ Export} \quad (14.2)$$

Expected total cost in local currency terms is multiplied by the conversion ratio. If the conversion ratio is greater than one (more import than export), the projected cost goes up and if it is less than one (more exports than imports), the project costs come down.

The **hawala rate** can also be considered instead of the official exchange rate, in which case (a) conversion ratio is not needed but (b) the net foreign exchange is taken at hawala rate; rather than at the official rate but (c) weight can still be considered in the equation.

Sometimes, some more concerns are built in the calculation of ERR, like depletion of valuable oil reserves, energy, economic ripple effects on employment generation and so on. Adjustment of these factors is not free from some degree of subjectivity but its necessity cannot be negated. Recognition of more such concerns gradually changes the concept of economic analysis to the social analysis.

Economic Rate of Returns (ERR)

The process of calculating the economic rate of return is very similar to the calculation of internal rate of return of a project. From the project cash flow calculated from the firm's perspective, first the economic cash flow is calculated as explained in the previous point and then, a rate is calculated at which the present value of the economic cash inflow is equal to the present value of the economic cash outflow. The formula can be presented as follows:

$$PV\ of\ Economic\ Cash\ Out\ flow = \sum \frac{Economic\ Cash\ Flow}{(1+ERR)^t} \quad (14.3)$$

where, t is the time period

The nation will have its own acceptable ERR. If the ERR of the project is greater than the acceptable ERR, the project is acceptable to the nation. The concept and calculation of ERR is useful in determining several fiscal policies of the nation, which would primarily include incentives and disincentives for private projects.

In the context of India, yet another example can be mentioned—infrastructure projects. Setting up a power plant or the construction of road is essential for the economic development of India. Cascading effect of power generation or road on the economy is significant. Therefore, net economic benefits of a power plant to the nation would be higher than its financial benefit to the promoters. A part of the economic benefits can be passed on to the company as their financial benefits via some incentives (e.g., tax break) and guarantees (e.g., rate guarantee).

14.3 SOCIAL RATE OF RETURN (SRR): SOCIAL COST-BENEFIT ANALYSIS

The concept of ERR can be expanded to encompass the social cost and benefits and thereby calculate the social rate of return. This method of project evaluation is also popularly known as social cost-benefit analysis (SCBA). Government and social projects are evaluated on the line of social cost-benefit analysis. Many international funding agencies would finance a social project based on its social rate of return.

SCBA is a very subjective method but conceptually sound. The following brief text gives a conceptual explanation. The details are kept out of the domain of this book. The readers who are interested in reading authentic material on SCBA should read 'Manual for the Evaluation of Industrial Projects', UNIDO publication, 1980 (reprinted 1993). Also 'A Guide to the Economic Appraisal of Projects in Developing Countries', by the Ministry of Overseas Development (1978) of Great Britain can be useful.

Financial analysis is carried out from the angle of investors or firm. Investors' net monetary benefits are in the centre of financial analysis of projects. It was discussed in the method of economic rate of return that the economic analysis is employed when the government is interested in its pure economic considerations. Social implications of a project can also be encompassed in the analysis and social rate of return can be calculated.

Non-Quantifiable Cost-Benefits in Projects

Financial cost-benefit is from the angle of a firm, economic cost-benefit is from the angle of a nation's economy. Both involve assessment of identifiable

rupee value of costs and benefits for either the firm or for the nation. Economic cost-benefit analysis will be done by government and government agencies in determining the incentives and disincentives to businesses either in terms of concessional rate of power supply or supply of cheap paper or guaranteed supply of scarce resources or offering guarantees like rate-guarantee and so on.

Some projects, private or government, generate non-quantifiable cost-benefits. Many projects of this kind are initiated to provide economic impetus and not for tapping the currently available opportunities. The ripple effects of such projects cannot be measured in economic terms as several costs and benefits are non-quantifiable at least immediately: for example, construction of a dam has several social costs like displacement of habitats, loss of agricultural land, potential effect on ecology and so on, against many social benefits like irrigation, flood control, beautification and tourism potential, etc. The landscape of the area may change to benefit some and harm some others on immediate terms and long-term basis. The Konkan Railway project is another example which can be mentioned here. The perspective was that once the Konkan railway would be completed, the area that it passes through, may start developing, even if it is a difficult terrain. However, it could not be ascertained what would be the rate of development and when the development could happen. But such projects do have ripple effects. In economically backward areas, social infrastructure projects like literacy programmes, education initiatives and family planning programmes create conditions for economic growth. The non-quantifiable costs and benefits in such projects are plenty. Such projects break the cycle that keeps the region backward. They cannot be evaluated either on financial or economic grounds.

In private projects, a kind of SCBA would help in shaping government policies and policies of foundations who work for the community. Some immediate concerns are built into the social cost-benefit analysis of private projects to determine the level of government incentives and disincentives. Today, global warming is an issue. The impact of global warming may not be felt in the foreseeable future but at least all (even beyond the scientific community) have started agreeing now that global warming is a serious issue. Therefore, any project that affects the ozone layer is less desirable and deserves disincentives and other projects like research for alternate energy or projects using alternative energy deserve incentives. Thus, today the environment effect must be built into the social cost-benefits.

Therefore, all agencies that aim at social welfare, like government and international institutions like the World Bank, International Monetary Fund and UNIDO will use social cost-benefit analysis for the evaluation of projects.

Basics of Social Cost-Benefit Analysis

Social projects of the government and those financed by the government will be appraised on SCBA lines. The following factors warrant social cost-benefit analysis:

- Market imperfection
- Externalities, taxes and subsidies
- Concern for savings
- Concern for redistribution
- Merit wants

Most of the factor markets are imperfect. The degree of market imperfection is high in underdeveloped and developing nations. Resources do not get fairly priced due to imperfection. Market imperfection is manifested in immobility of resources or in mobility-shy resources. Land is not mobile. Lack of infrastructure keeps away the business from faraway places where land may be very cheap. Labour is mobility shy due to family and social reasons, coupled with inadequate communication facilities and immigration laws. Other resources like material are also not freely mobile due to transportation, banking and warehousing facilities and associated costs and government-imposed restrictions worsen the mechanism of pricing of resources planned as a part of the project. Due to such reasons, market prices do not reflect the true economic prices, requiring the use of shadow price for the valuation of costs and benefits.

Typical low savings and investment rates are also the features of underdeveloped and developing nations. Any project, which generates savings, will do economic good to the nation because the cascading effects of savings will be experienced by the economy. Similarly, unequal distribution of income and income generating opportunities are also matters of concern for such nations. A project, which results in effective redistribution of income, is more valuable than those projects where income is concentrated in a few hands. Some of the resources consumed or produced may be dearer (merit goods) than the others. These factors of generation of savings, income redistribution and consumption or production of merit goods must be assigned a higher value as they are the immediate concerns of developing nations.

UNIDO Approach for SCBA

As in any project evaluation, SCBA also involves estimating costs and benefits in terms of cash flow and determining discount rate so that net present value of the project can be calculated.

Estimating social cash flow

United Nations International Development Organization (UNIDO) follows five steps (first two plus three sub-steps listed in the third point below) in estimating cash flow in the SCBA approach.

(a) Calculation of financial profitability of a project, measured at the market price of resources and output

(b) Calculation of the net benefits of projects measured in terms of economic prices. Some resources are priced at international prices and for some resources, shadow prices are considered

(c) Adjust the net economic costs and benefits with the following impacts of the project to get social cost and benefits:

- Savings and investments
- Income redistribution
- Merits and demerits goods

Calculating financial cost-benefits

The first step of measuring the financial profitability of a project at market price, involves evaluation of the project from the company's angle only. When it is translated into the economic cost-benefits, some costs and benefits are excluded because they only amount to change of hands in the economy as stated in the discussion on ERR and the economic cost and benefits are priced at economic rates, rather than markets rates.

Calculating economic cost-benefits

Goods produced and consumed by the project must be handled in three sub-steps, namely,

(a) Separate non-economic cost-benefits from economic benefits

(b) Identify **tradable** goods and price them

(c) Identify **non-tradable** goods and price them

As discussed earlier, some flow of money in financial cost-benefits may not involve any economic costs or benefits. These cash flows must be excluded from the social cost benefit analysis. Specific financial cash flow being a non-economic cash flow is always economy specific issue. Therefore, UNIDO has developed application models for different economies.

There are three alternative pricings possible for the goods and services namely,

- Market (producer's) price
- Free-trade price (world price)
- Shadow price, and second best shadow price

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For determining the prices, the goods and services are grouped in two categories,

- Tradable goods and services, and
- Non-tradable goods and services

Goods that are imported or exported or close to being imported or exported are **tradable goods.** Because of market distortions one cannot take market price for tradable goods. Therefore, tradable goods are priced at the international price of goods. Resources consumed are priced at CIF (cost, insurance and freight), and resources produced at FOB (free on board). It is assumed here that one and only one international price is available and that is determined only by market forces without any external factors like political pressure or dumping.

There are also some **non-tradable goods.** For example, value of lives saved, value of time saved, cost of pollution etc. Also included in non-traded goods are land, buildings, electricity, transportation and others, which are not traded internationally. As a result international prices are not available as the economic prices. These non-tradable goods are valued at the shadow prices. Some bases for shadow prices are suggested below:

Sources of shadow price	*Basis of shadow price*
Project may increase or decrease.....	
.....consumption in economy	willingness to pay
.....production in economy	economic cost of production
.....import/export	foreign exchange rate

To a large extent what are tradable goods and what are not, as well as what should be the shadow prices of non-tradable goods also depends on economic specific realities. Therefore, within a broad model, specifics are designed separately for each nation, and they may be subject to change from time to time with the changing phases of economic development.

Adjustment for social concerns

The developing nations have largely three major social concerns—impact on savings, impact on income distribution and some goods may be merit goods and other demerit ones. The economic values derived at the end of the second step explained above must be adjusted for these three concerns. The adjustment is based on the extent the project contributes in achieving the goals of social concerns.

- Incorporating Impact on Savings

  The impact on savings is measured as per equation 14.4.

  Impact on Savings $= \sum \Delta y_i \times MPS_i$ (14.4)

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where, Δy_i = change in savings in year i

MPS = marginal propensity of savings in year i

The value of rupee of savings is the present value of additional consumption stream produced when that rupee of saving is invested at the margin. As a thumb rule, it is believed that one rupee invested in agriculture generates say ₹7, industry ₹10, infrastructure projects ₹30 and social infrastructure generates a net value of ₹70.

- Incorporating Impact on Income Redistribution

The impact on income redistribution is measured in terms of willingness to pay. Various sectors or parties, like the project itself, other businesses, government, workers, consumers and others, may gain or lose due to the project. Their willingness to pay (or charge) for goods they receive (or lose) is estimated. However, the methods of estimation may be much less objective. For example, a survey method, which involves administration of questionnaire may not offer reliable shadow price because of lack of experience of goods and also because of psychological issues if they are the loser of goods. One can determine weight (price) by using elasticity of marginal utility of income based on the equation 14.5.

$$W_i = \left(\frac{B}{C_i}\right)^n \qquad (14.5)$$

where, W_i = weight assigned to income at the level of C_i

B = base-level income, with weight of 1

n = elasticity of marginal utility of income

- Incorporating Importance of Goods

Merit goods are the ones whose social value is greater than their economic value. For example, conservation of oil and generation of employment are more valued items. Energy is a merit good. Some others are demerit goods, where social value is less than economic value. Cosmetics are demerit goods. The list of merit and demerit goods and their importance may vary from nation to nation.

Economic prices of resources are adjusted upward or downward, as the case may be, on the consideration of savings, income distribution and merit or demerit goods. The adjustment factors for various resources are generally pre-decided by an agency, like UNIDO for each country. These factors are periodically reviewed in the light of changed conditions.

The stream of social costs and benefits is obtained after the five steps described above.

Little-Mirrlees Approach to SCBA (L-M Manual)

In the field of social cost-benefit analysis, the other approach which is more discussed is Little-Mirrlees (L-M) approach or manual. Little-Mirrlees (1969) wrote this approach for O.E.C.D. (Organization for Economic Cooperation and Development), this approach created several controversies, which resulted into many others authors too joining the attempt of explanation and further clarification.

The basic concept of SCBA in UNIDO approach and in L-M approach is the same. Most approaches are also same, but some countries and the World Bank use L-M approach because it gives ready-to-use detailed procedure for computation of difficult shadow prices. The main contribution of L-M is in bringing simplicity by the way of using 'world prices' or 'real foreign exchange prices' as shadow prices for all goods whether tradable or non-tradable. It is based on the assumption that international market is perfect or efficient. L-M approach suggests that,

- Use c.i.f. (cost-insurance-and-freight or import) price if the goods the produced in the economy reduce import
- Use f.o.b. (free-on-board or export) price if the goods produced in the economy are available for export.

Now, one can see a similarity with UNIDO approach in the above suggestions, but the difference is that these suggestions are even applicable to the pricing of non-tradable goods. Still the Little-Mirrlees approach is less widely used than was initially expected (Squire, 1996).

Estimating Social Discount Rate

One needs to determine the rate at which cash flow must be discounted for calculating the net present value. Alternatively one can calculate the internal rate of returns for a given cash flow. The internal rate of return in the SCBA is known as **social rate of return** (SRR). SRR is the rate at which the present value of cash inflow is equal to the present value of cash outflow. However, SRR has to be compared with a benchmark, which is social discount rate (or social required rate of return). Thus, whether NPV is calculated or SRR, one needs to know the **social discount rate**.

Applying the opportunity cost rule, the SRR from the project foregone in favour of this project should be taken as a social required rate of return or social discount rate. Some alternatives are:

- After-tax interest rate
- Consumption rate of interest
- Foreign exchange in the hands of government

After-tax interest rate is more appropriate from the firm's angle in calculating financial rate of return. In the absence of the opportunity return, the consumption rate of interest can be taken as the cut-off rate, as done in UNIDO approach. L-M approach is in favour of using 'investment discount rate'. The discount rate should then be the relative value of future versus present foreign exchange held by the government. They argue that in a developing country's context, marginal foreign exchange in the hand of the government will be used for investment, so the discount rate should be an investment discount rate rather than a consumption discount rate. Some others argue and recommend integrating equity concerns because the funds used by the governments especially have intergenerational equity effect. Intergenerational equity occurs in deficit financing activity, because the burden of deficit financing is on the future generation, implying that the cost of equity in the future is relevant as a discount rate. Thus, intergenerational equity cost should be considered as the social required rate of return.

Check Your Progress

1. Mention the examples where the firm's cash flow is not the cash flow for the economy.
2. What is the process of calculation of economic rate of return similar to?
3. List the factors which warrant social cost-benefit analysis.
4. What are some of the non-tradable goods used for calculation of economic cost-benefits?

14.4 CAPITAL AMORTIZATION SCHEDULE (CAS)

Amortization is an accounting technique used to periodically lower the book value of a loan or intangible asset over a set period of time. In relation to a loan, amortization focuses on spreading out loan payments over time. When applied to an asset or capital, amortization is similar to depreciation. All capital assets wear out or decline in usefulness and value as they become aged and are used, thus an amortization expense must be recorded. Accounting amortization is the process of allocating or matching the cost of capital assets over the time that they are used. Cost of capital assets should be amortized over their useful lives.

The CAS method introduced is found to be a perfect substitute for the DCF method. The CAS method is transparent and has many advantages discussed here. This method, unlike the DCF method, clearly identifies and quantifies the reinvestment. The CAS method reveals that reinvestment leads to multiple IRR and spurious NPV. Hitherto, the spurious nature of NPV

caused by the reinvestment is neither studied nor reported and therefore the NPV rule has been supported. The modified CAS (MCAS) method eliminates the reinvestment and thereby resolves the problem of multiple IRR and leads to a unique and real IRR and eliminates the spurious NPV too. It allows estimating the IRR as a return on the total capital investment and on the declining balance of capital.

There are three factors used in determining amortization expense. They are:

(a) Cost of Capital Asset

The cost of a capital asset is all necessary and reasonable expenses incurred to prepare the asset for its intended purpose or use.

(b) Salvage Value

Salvage value is also known as residual or scrap value. Salvage value is the estimated amount of money the corporation expects to receive from selling or disposing off the asset at the end of its useful life. Other companies also prefer trading off their asset for a quicker transaction.

(c) Useful Life

The useful life of a Capital asset is the estimated # of years the asset is expected to be used in business operations of the company. Also known as 'service life', useful life is not necessarily the asset's total productive life. For example, the total estimated life of a brand new computer is 3 – 4 years, yet many large organizations prefer to trade in their old computers for new ones every 2 years. In this regard, the computers would have a useful life of two years.

Predicting the useful life of an asset is a hard thing to do because of several reasons. These include wear and tear from normal business operations, obsolescence and inadequacy. When an organization is growing fast, its assets become obsolete faster, as the company needs new improved technology or hardware to keep growing. Thus, inadequacy refers to the condition where the capacity of the company's capital assets is not strong enough to meet the needs of its operations. Obsolescence refers to when due to sophisticated new technological advancements and improvements, the company's current capital assets become obsolete and need to be replaced. The company usually disposes off the obsolete asset before it reaches its full useful life.

14.5 RISK ADJUSTED DISCOUNT RATE (RADR)

Risk adjustment is the real issue in the determination of the cut-off rate for projects. When the discount rate is calculated after the adjustment for risk, it

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is called risk adjusted discount rate, popularly known as RADR. A simplistic formula for RADR will look like the one below:

$$RRR = RADR = Rf + Rp \qquad (14.6)$$

where, R_f = risk-free rate

R_p = risk premium

Four different methods can be prescribed for RADR calculation. The list of four methods is given below:

- Intuitive approach
- Constant share price approach
- CAPM approach
- Adjusted WACC approach

Of these four methods, the last one is the pragmatic approach, widely prescribed for RADR calculation.

14.5.1 Intuitive Approach

Risk premium can be estimated based on intuitive judgment, and added into the risk free rate prevailing in the economy. Generally, the interest rate on government securities is considered as the risk-free rate. The load of the risk premium is subjectively decided. Firms usually predetermine different risk premiums for different types of projects. For example, 3 per cent premium for replacement of machinery, 5 per cent for expansion, 8 per cent for new product development and 12 per cent for research projects, may be considered as the risk premium. The subjectivity can be reduced if the risk premium is estimated on the basis of the degree of operating leverage of the project.

This method suffers from all the limitations of any subjective method of decision making. Moreover, it does not consider the portfolio risk effect of the project. A high-risk business can accept another risky project and still overall risk of business may decline if the cash flow from the current business and that from the new project are inversely correlated with each other. This would justify the use of lower discount rate, but intuitive approach does not consider such 'portfolio' effect on risk and returns.

14.5.2 Constant Share Price Approach

The intuitive method assumes that the risk of the project depends upon the class of project, the portfolio risk not being relevant. The constant share price approach for determining the risk-adjusted discount rate is concerned about the net change in the overall risk of the business due to the inclusion of a proposed project in the portfolio. Therefore, this method is also known as 'portfolio effect adjustment'. The condition in this case is that 'the new project must earn at least that much which is enough to maintain the current level of share price (wealth)'.

14.5.3 CAPM Aapproach

The capital asset pricing model (CAPM) calculates the expected return by shareholders. The CAPM formula is as follows:

$$K_e = R_f + (R_m - R_f)\beta_i \quad (14.7)$$

where, R_m = return on market port-folio

R_f = risk-free rate

β = systematic risk of the company (covariance of return on firm's share and market return)

Shareholders calculate their expected return by studying the security returns. Likewise, a business firm invests in various projects. If shareholders are substituted with firms and equity share (security) with projects, the CAPM can be applied for the calculation of the required rate of return by a firm from its investment in a project. For application of the CAPM in a project situation, R_m (market return) will be the returns from a well- diversified project portfolio, and $ß_i$ will be the covariance of returns from the proposed project with project market returns. Here, many difficulties may be encountered, some of which may be:

- Unlike the share market, there is no 'project market'. Therefore, project-market return data can be only surrogate data. One may have to settle for the average return in the economy as a substitute for project market return.
- Unlike the history of a firm's shares, the history of project return is not yet known as the project is at the planning stage. This is a difficulty similar to finding the CAPM-based K_e when equity shares are either not listed or not traded on a stock market.
- The solution to the difficulty described in the second point above can be found if a proxy project is available. A proxy project is the one which is similar to the proposed project of the company, and that is already on stream. The returns from the proxy project and project market returns can be studied. The relationship between the returns from proxy project and project market return can be considered as the indicator of expected returns on the proposed project. However, yet another difficulty may be encountered here. A proxy project may be of a company whose capital structure is different than that of the company in question. This difficulty can be overcome by adjusting for the difference in the debt-equity ratio.

The following steps are followed for the calculation of the CAPM-based risk-adjusted discount rate for a corporate project.

(a) Find the returns on project market.

(b) Find a project of similar type and size, already undertaken by some other firm, and collect data for that proxy project's return.

(c) Find b of the proxy project returns with the project market returns.

(d) Adjust for debt-equity difference between the firm of the proxy project and the firm which plans to undertake the proposed project.

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14.5.4 Adjusted WACC approach

The CAPM suffers from limitations when it is applied to the project situation. Therefore, one has to search for an alternative method for the adjustment of risk. The cost of capital can be taken as the basis and differential risk premium can be adjusted in it for finding the risk adjusted discount rate. This is expressed in the equation form as follows:

$$RADR = WACC \pm \Delta R_p \qquad (14.8)$$

where, ΔR_p indicates differential (change in) risk premium

If the new project is in the same risk class and it is unlikely to change the risk profile of the business, DR_p will be zero. The new project, hence, is discounted at the weighted average cost of capital. Theoretically, CAPM-based RADR and WACC based RADR will be equal. It will also give the same result as the basic equation of RADR (RADR = $R_f + R_p$).

This method is very similar to the 'Constant Share Price Approach' of determining RADR. The difference lies in the base data consumed. Instead of EPS, in 'Constant Share Price Approach', the cost of capital is taken as a basis in the adjusted WACC Approach.

The adjusted WACC approach can be practiced in the following steps:

- Calculate WACC before the announcement of the investment and financing plans of the firm.
- Announce the details of the investment and financing plans for the next period to come.
- Allow the market to respond to the announcement, and watch the market prices stabilizing after the announcement.
- Take the new values of bonds and stock and calculate the new WACC after the announcement. The new WACC is the reflection of change, if any, in the firm's risk.
- Then, calculate the RADR and use it as the required rate of return from the new projects.

Check Your Progress

5. What is the CAS the perfect substitute for?
6. Why is predicting the useful life of an asset is a hard thing to do?
7. State the assumption behind the intuitive approach to RADR calculation.

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14.6 ANSWERS TO CHECK YOUR PROGRESS QUESTIONS

1. The following can be mentioned as examples where the firm's cash flow is not the cash flow for the economy:
   (a) Subsidy received by the company on project investment
   (b) Income tax and other direct and indirect tax expenses in the project report
2. The process of calculating the economic rate of return is very similar to the calculation of internal rate of return of a project.
3. The following factors warrant social cost-benefit analysis:
   - Market imperfection
   - Externalities, taxes and subsidies
   - Concern for savings
   - Concern for redistribution
   - Merit wants
4. Examples of the non-tradable goods in the calculation of economic cost-benefits include value of lives saved, value of time saved, cost of pollution etc. Also included in non-traded goods are land, buildings, electricity, transportation and others, which are not traded internationally.
5. The CAS method introduced is found to be a perfect substitute for the DCF method.
6. Predicting the useful life of an asset is a hard thing to do because of several reasons. These include wear and tear from normal business operations, obsolescence and inadequacy.
7. The intuitive method assumes that the risk of the project depends upon the class of project, the portfolio risk not being relevant.

14.7 SUMMARY

- A firm's cost and benefits from the project and internal rate of return (IRR) earned by the project for the firm is not an indicator of the net benefit to the nation's economy. Economic costs and benefits and economic rate of returns are calculated for determining the economic impact of a project.
- Costs and benefits of a project to the national economy are measured by making an adjustment in the financial cash flow of a project.

- Some project cash flows occur for a firm but in the context of the national economy, it may not be a cash flow. These items are excluded from the calculation of economic cash flow.
- A firm's financial cash flow would take actual value of the resources consumed and earned: for example, of foreign exchange. But, economic value of those cash flows may be different because these resources are dearer to the national economy. Therefore, the economic value of such financial cash flow must be adjusted either up or down, depending upon how much dear each one of them is.
- The process of calculating the economic rate of return is very similar to the calculation of internal rate of return of a project. From the project cash flow calculated from the firm's perspective, first the economic cash flow is calculated as explained in the previous point and then, a rate is calculated at which the present value of the economic cash inflow is equal to the present value of the economic cash outflow.
- The concept of ERR can be expanded to encompass the social cost and benefits and thereby calculate the social rate of return. This method of project evaluation is also popularly known as social cost-benefit analysis (SCBA).
- All agencies that aim at social welfare, like government and international institutions like the World Bank, International Monetary Fund and UNIDO will use social cost-benefit analysis for the evaluation of projects.
- United Nations International Development Organization (UNIDO) follows five steps (first two plus three sub-steps listed in the third point below) in estimating cash flow in the SCBA approach: Calculation of financial profitability, Calculation of net benefits of projects, and adjustment of the net economic costs and benefits.
- In the field of social cost-benefit analysis, the other approach which is more discussed is Little-Mirrlees (L-M) approach or manual. Little-Mirrlees (1969) wrote this approach for O.E.C.D. (Organization for Economic Cooperation and Development), this approach created several controversies, which resulted into many others authors too joining the attempt of explanation and further clarification.
- Accounting amortization is the process of allocating or matching the cost of capital assets over the time that they are used. Cost of capital assets should be amortized over their useful lives.
- There are three factors used in determining amortization expense: cost of capital asset, salvage value, and useful life.

- Risk adjustment is the real issue in the determination of the cut-off rate for projects. When the discount rate is calculated after the adjustment for risk, it is called risk adjusted discount rate, popularly known as RADR.
- Four different methods can be prescribed for RADR calculation. The list of four methods is given below:
  - o Intuitive approach
  - o Constant share price approach
  - o CAPM approach
  - o Adjusted WACC approach

14.8 KEY WORDS

- **Hawala:** It refers to the informal channel of transferring funds from one location to another.
- **SRR:** It is the rate at which the present value of cash inflow is equal to the present value of cash outflow.
- **Amortization:** It is an accounting technique used to periodically lower the book value of a loan or intangible asset over a set period of time.
- **Capital asset pricing model:** It refers to the model explaining the relationship between expected returns for an asset and the systematic risk involved.

14.9 SELF ASSESSMENT QUESTIONS AND EXERCISES

Short-Answer Questions

1. Mention the process of calculating economic rate of returns.
2. What are the non-quantifiable cost-benefits in projects?
3. Write a short note on the factors warranting social cost-benefit analysis.
4. Briefly explain Little-Mirrlees Approach to SCBA (L-M Manual).
5. Write a short note on the benefits of Capital amortization schedule.
6. What are the three factors used in determining amortization expense?

Long-Answer Questions

1. Discuss the calculation of economic cost-benefits.
2. Describe the UNIDO approach for SCBA.
3. Explain the different methods can be prescribed for RADR calculation.

14.10 FURTHER READINGS

Sahaf, M. A. 2013. *Management Accounting: Principles and Practice*, 3rd edition. New Delhi: Vikas Publishing House.

Arora, M. N. 2012. *A textbook of Cost and Management Accounting*, 10th edition. New Delhi: Vikas Publishing House.

Maheshwari, S. N., Suneel K. and Sharad K. 2018. *A Textbook of Accounting for Management*, 4th edition. New Delhi: Vikas Publishing House.